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Soils of the Albuquerque District: A Guide to Their Use and Management

PART II

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Albuquerque, New Mexico

April, 1980

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SOIL ASSOCIATIONS: CHACO PLANNING UNIT

1. Lohmiller - Navajo
2. Penistaja - Sheppard - Rockland
3. Persayo - Billings - Badland
4. Las Lucas - Litle - Persayo
5. Travessilla - Rockland
6. Travessilla - Persayo - Rockland
7. Basalt Rockland - Cabezon - Torreon
8. Persayo - Camborthids
9. Persayo - Billings
10. Rockland - Billings
11. Chipeta - Sheppard - Shiprock
12. Penistaja - Lohmiller - Travessilla
13. Penistaja - Sheppard - Palma
14. Lohmiller - San Mateo
15. Moriarty - Prewitt
16. Hagerman - Travessilla
17. Rockland - Bond
18. Prieta - Thunderbird
19. Thurloni - Savoia - Concho
20. Argiborolls
21. Persayo - Garb
22. Doak - Shiprock
23. Shiprock - Sheppard
24. Badland - Rockland
25. Camborthids - Farb
26. Persayo - Lohmiller
27. Rockland - Travessilla
28. Billings - Badland

Soils

Refer to Overlays

P-2 5 -Soils (Map 1)

P-2 6 -Soils (Map 2)

P-2 7 -Soils (Map 3)

Soil Associations

A soil association is a distinctive, proportioned pattern of soils on the landscape. It usually consists of one or more major soils and at least one minor soil; it is named for the major soil(s). The soils in one association may occur in another, but in a different pattern.

Soil associations give a relative indication of the relationship of soils in the area. They are useful for comparing different parts of an area or in locating large tracts that are suitable for certain uses or have particular limitations to use. They are not suitable for planning the management or use of a specific location, because the soils in an association ordinarily differ in depth, texture, slope, and other characteristics.

Twenty eight soil associations have been delineated in the Chaco Planning Area (Refer to Table .33B1-1). A short description of the soil associations within ten general groupings of associations follows, and must be used in conjunction with Table .33B2-1, "Physical and Chemical Characteristics of Soils", and Table .33B2-2, "Interpretations For Selected Uses of Major Soils." These tables provide specific information about each soil within an association, and list degrees and kinds of limitations for certain uses.

General Soil Association Groupings

a. Soils of the Valley Bottoms, Floodplains, and Terraces.

b. Gently Sloping to Undulating Mesas, Upland Slopes and Alluvial Fans.

c. Gently to Strongly Sloping and Undulating Upland Hillsides, Valley Sideslopes, Floodplains, and Alluvial Fans.

d. Valley Sideslopes, Alluvial Fans, and Hillsides that are Gently to Strongly Sloping on Shale Bedrock or Alluvium.

e. Gently Sloping and Undulating Plains and Alluvial Fans on Sandstone Bedrock.

f. Cobbly, Stony Soils on Gently to Strongly Sloping Basalt-capped Mesas And in Lava Flows.

g. Gently Sloping to Steep and Rolling Uplands with Intermingled Mesa Breaks, Escarpments and Benches.

h. Moderately Sloping to Steep Rough Broken Land, Ridges, and Canyon Sides, With Soils that are Usually Cobbly and Stony.

i. Moderately Sloping to Steep Canyon Sides and Rough Broken Land with Narrow Valley Floors, and Rockland.

j. Gently Sloping to Very Steep Sideslopes on Nearly Barren Sandstone and Shale Exposures.

General Soil Association Groupings

a. Soils of the Valley Bottoms, Floodplains, and Terraces.

Lohmiller - Navajo (1)

Lohmiller - San Mateo (14)

Moriarty - Prewitt (15)

These soil associations occur adjacent to intermittent drainages and along river valleys. They are developing in fine to moderately coarse-textured alluvium from sand stone and shale. Soils are deep (over 40 inches in depth) and have surface textures that range from loam to clay. Subsoil or subsurface material varies in texture from sandy loam to clay, and substratum material may include gravel and cobble. Watertable levels generally fluctuate between two and seven feet. The soils are easily eroded, and deep, vertical-walled gullies occur in the immediate valley bottoms. Gravelly alluvium generally forms the divide between the valley bottoms and the uplands.

Inclusions of small areas with poor drainage and with salt accumulations are scattered throughout

these soils. The fine-textured soils are usually alkali-affected and have slow permeability. Watertable, alkalinity, shrink-swell, and piping hazard are the primary limitations to development and use of these soils.

b. Gently Sloping to Undulating Mesas, Upland Slopes, and Alluvial Fans.

Doak - Shiprock (22)
Penistaja - Sheppard - Palma (13)
Penistaja - Sheppard - Rockland (2)
Shiprock - Sheppard (23)

These soils are developing in alluvial and eolian deposits on ancient stream terraces or alluvial fans; deposits are relatively deep over sandstone or shale. Geologic erosion has left areas of these soils on elevated mesas and sideslopes. Surface textures range from loamy sand to light clay loam, subsoil or subsurface textures are loamy fine sand to clay loam, and substratums range in texture from loam to sand. Soils are over 60 inches in depth, with moderate to rapid permeability. Inclusions of shallow soils on sandstone or shale, soils with gravelly substrata, alkali-affected areas, and Rockland and Badland are present in small amounts.

c. Gently to Strongly Sloping and Undulating Upland Hillsides, Valley Sideslopes, Floodplains, and Alluvial Fans.

Billings - Badland (28)
Persayo - Lohmiller (26)
Chipeta - Sheppard - Shiprock (11)
Persayo - Billings (9)
Thurloni - Savoia - Concho (19)
Persayo - Billings - Badland (3)
Penistaja - Lohmiller - Travessilla (12)
Persayo - Camborthids (8)
Persayo - Farb (21)

These soils are developing on residual sandstone or shale, in alluvium from those same sources, or in deep eolian sands. In general, the shallow and moderately deep soils (less than 40 inches deep over bedrock) are developing in the upland areas on hillsides and valley sideslopes. The deep, finer textured soils usually occur on the intermittent floodplains and alluvial fans. Surface textures range from fine sand to clay, while substratums range from shale or sandstone bedrock to clay. Permeability is slow to moderate in the finer textured soils, while coarser textured soils have

moderate to rapid permeability. Correspondingly, the coarser-textured soils have low water holding capacity and are much more susceptible to wind erosion (Soil Association 12). High run-off rates occur on the shallow clayey soils. Small inclusions of alkali-affected soils and very steep rock outcrop and escarpments are present. Gravelly stratified alluvial soils also occur, particularly in the intermittent flood plains.

d. Valley Sideslopes, Alluvial Fans, and Hillsides that are Gently to Strongly Sloping on Shale Bedrock or Alluvium

Las Lucas - Litle - Persayo (4)

The soils of this association are developing in olive to gray colored shale alluvium or weathered shale residium. The shallow Persayo soils occur on the shale ridges and knolls; moderately deep to deep Las Lucas and Litle soils are developing on the valley sideslopes, fans, and hillsides. Surface textures range from loam to silty clay loam.

Substratums are weathered shale. Seams and fine threads of gypsum and lime crystals are present in the soils. Permeability is slow, and the soils are

easily eroded by water. Moderately extensive inclusions of shale and sandstone rock land are a component of this association. Steep-walled gullies dissect some of the less-sloping, swale-like areas.

e. Gently Sloping and Undulating Plains and Alluvial Fans on Sandstone Bedrock

Camborthids - Farb (25)

These soils are developing residually from sandstone. The Camborthids are the most extensive; they are moderately deep (20 to 40 inches deep) and are underlain by interbedded sandstone and shale. Farb soils are shallow over weathered sandstone bedrock. Permeability is moderate to moderately rapid, and water holding capacity is low to moderate. Surface textures range from fine sandy loam to sandy loam. Sub stratums are weathered sandstone or sandstone and shale. These soils are moderately susceptible to wind erosion when vegetative cover is sparse or has been removed. Inclusions of sandstone outcrop make up about 20 percent of the association.

f. Cobbly, Stony Soils on Gently to Strongly Sloping Basalt Capped Mesas and in Lava Flows

Basalt Rockland - Cabezon - Torreon (7)
Prieta - Thunderbird (18)

These soils are developing on basalt-capped mesas in material weathered from basic volcanic rocks. Basalt rockland occurs as steep escarpments, mesa sideslopes, lava flow fronts, and as isolated basalt hills or outcrops. It includes some shallow, rocky soils. Cabezon soils are shallow and have stony loam surface textures and cobbly clay subsoils that overlie basalt. Torreon soils occupy the more open grassland areas. They are deep, with soil textures that range from loam to silty clay loam. Inclusions of intermittent lakes and depressional areas that contain water for short periods are also present in this association. Permeability in these soils is slow to moderate.

Prieta - Thunderbird soils are shallow to moderately deep over basalt. Soil textures range from stony clay loam to clay and are slowly to moderately permeable. Thunderbird soils are deeper than the Prieta soils and--like Torreon soils--occur in the more open grassland areas. Subsoils are clay and

are slowly permeable. These soil associations have a low erosion hazard. They are not extensive.

g. Gently Sloping to Steep and Rolling Uplands with Intermingled Mesa Breaks, Escarpments, and Benches

Hagerman - Travessilla (16)
Travessilla - Persayo - Rockland (6)

The soils of these associations occur on the mesa tops and benches. They are usually shallow to moderately deep and are developing in residually weathered sandstone and smaller areas of weathered shale. Soil textures range from fine sandy loam to silty clay loam, and substratums are weathered sandstone or shale. Permeability is slow to moderate over bedrock. Rough broken land is relatively extensive and generally consists of a complex of very shallow soils and outcrops of weakly cemented sandstone, clays, gravel or shale. The deep sandy Sheppard soils occur as broad ridges on the upland mesas, as swales on the higher parts of alluvial fans, and as broad ridges on their lower portions. Textures range from loamy fine sand to sand. The soils are rapidly permeable. Major problems in these soil associations are high run-off and active erosion. Inclusions of Badland and

narrow valley bottoms are usually dissected by gullies.

Moderately Sloping to Steep Rough Broken Land, Ridges, and Canyon Sides, with Soils that are Usually Cobbly and Stony

Argiborolls (20)

These soils are developing in materials weathered from sedimentary rocks, primarily sandstone and shale. They are moderately deep to deep, and surface textures range from cobbly clay loam to cobbly and stony sandy loam. Subsurface and subsoil textures range from cobbly or stony sandy clay loam to clay. Substratums are shale or sandstone bedrock at depths between 30 and 50 inches. Permeability is slow to moderate. Inclusions of Rockland are common, and soils in the narrow valley areas are typically non-stony and deep. These areas are not extensive. Elevations range from 6,200 feet to 8,000 feet.

i. Moderately Sloping to Steep Canyon Sides and Rough Broken Land with Narrow Valley Floors, and Rockland

Rockland - Billings (10)
Rockland - Bond (17)
Rockland - Travessilla (27)
Travessilla - Rockland (5)

These soils associations are dominated by rough, broken topography and Rockland. The Rockland includes escarpments, steep canyon walls, rocky ridgetops, rock slides, rock ledges, and steep breaks, all of which are dominated by rock outcrop and small areas of highly variable soil. Parent materials are predominately sandstone and shale. Soils in the narrow valley bottoms are deep and highly variable. They include the Billings soils with clayey textures and slow permeability. Travessilla and Bond soils characterize the shallow soils on moderately steep and rolling upland benches, sideslopes, and mesa tops. They have sandy textures and moderate to rapid permeability over sandstone. Scattered inclusions of Badland and Gullied Land are part of the landscape.

j. Gently Sloping to Very Steep Sideslopes on Nearly Barren Sandstone and Shale Exposures

Badland - Rockland (24)

This association is the largest in San Juan County. Topography ranges from nearly level, narrow alluvial valley bottoms and rolling hills to very steep slopes on escarpments and breaks. It occurs where nearly barren exposures of sandstone and shale are prevalent. Badland is the most extensive land type and is forming in soft shale at differing stages of weathering. Soils in the narrow valley bottoms are usually stratified and vary widely in texture. Rockland includes escarpments, breaks, and steep mesa sideslopes. Small areas of highly variable soils are scattered throughout the Rockland. There are numerous intermittent drainage channels, and low intake rates and very slow permeability produce high run-off after normal rains. Much of the area is salt or alkali-affected.

REFERENCES

This section was prepared from soil survey information provided by the U. S. Department of Agriculture, Soil Conservation Service, Albuquerque, New Mexico in cooperation with NMSU Agricultural Experiment Station.

TABLE .33B2-I

** PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
1. Lohmiller-Navajo		0 - 3								
Lohmiller	40		60	clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16
Navajo	23		72	clay	clay	clay, silty clay	7.9 - 8.4	<0.02	0.14 - 0.16	2 - 8
Gullied Land	15		-	-	-	-	-	-	-	-
Other soils, land types	22		-	-	-	-	-	-	-	-
2. Penistaja-Sheppard-Rockland										
Penistaja	45	3 - 5	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 8.4	0.6 - 6.0	0.09 - 0.16	-
Sheppard	25	3 - 9	60	Loamy sand	Loamy fine sand	sand, loamy sand	7.9 - 9.0	6.0 -20.0	0.05 - 0.08	0 - 2
Rockland	15	9 - 60	-	-	-	-	-	-	-	-
Other soils, land types	15	3 - 15	-	-	-	-	-	-	-	-
3. Persayo-Billings-Badland										
Persayo	35	5-25	10-20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Billings	35	0-5	72	silty clay loam	clay loam	silty clay Loam	7.4 - 9.0	0.06 - 2.0	0.14 - 0.19	2 - 4
Badland	15	9-75	-	-	-	-	-	-	-	-
Other soils, land types	15	-	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
4. Las Lucas-Litle-Persayo										
Las Lucas	30	3 - 5	40 - 60	loam	clay loam	shale	7.9 - 9.0	0.06 - 2.0	0.15 - 0.20	< 2
Litle	25	3 - 5	20 - 40	clay loam	clay	shale	7.4 - 8.4	0.06 - 0.6	0.12 - 0.21	2 - 8
Persayo	25	1 - 9	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Other soils, land types	20	-	-	-	-	-	-	-	-	-
5. Travessilla-Rockland										
Travessilla	40	3 - 25	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
Rockland	25	30 - 75	-	-	-	-	-	-	-	-
Other soils, land types	35	-	-	-	-	-	-	-	-	-
6. Travessilla-Persayo-Rockland										
Travessilla	30	3 - 25	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
Persayo	25	3 - 25	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Rockland	25	25 - 75	-	-	-	-	-	-	-	-
Other soils, land types	20	-	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity mmhos/cm
				Surface	Underlying Layer	Substratum				
7. Basalt Rockland-Cabezon-Torreon										
Basalt Rockland	40	25 - 75	-	-	-	-	-	-	-	-
Cabezon	32	1 - 15	10 - 20	stony loam	cobbly clay	basalt	6.1 - 7.3	0.06 - 2.0	0.11 - 0.15	< 2
Torreon	23	1 - 15	40 - 60	loam	silty clay loam	silty clay loam	6.6 - 8.4	0.06 - 2.0	0.14 - 0.21	< 2
Other soils, land types	5	1 - 15	-	-	-	-	-	-	-	-
8. Persayo-Camborthids										
Persayo	40	1 - 15	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Camborthids	20	1 - 9	20 - 40	fine sandy loam	fine sandy loam	sandstone	7.9 - 8.4	0.6 - 2.0	0.08 - 0.17	< 2
Rockland	20	30 - 75+	-	-	-	-	-	-	-	-
Other soils, land types	20	-	-	-	-	-	-	-	-	-
9. Persayo-Billings										
Persayo	60	0 - 15	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Billings	25	0 - 5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06 - 0.2	0.14 - 0.19	2 - 4
Lohmiller	15	0 - 3	60	clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE Surface	Underlying Layer	Substratum	Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
10. Rockland-Billings										
Rockland	55	30 - 75	-	-	-	-	-	-	-	-
Billings	15	0 - 5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06 - 0.2	0.14 - 0.19	2 - 4
Lohmiller	10	0 - 3	60	clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16
Farb	10	3 - 30	10 - 20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.05 - 0.10	2 - 4
Other soils, land types	10	3 - 30	-	-	-	-	-	-	-	-
11. Chipeta-Sheppard-Shiprock										
Chipeta	58	0 - 15	10 - 20	silty clay loam	clay, clay loam	Shale	7.4 - 8.4	0.06 - 0.2	0.15 - 0.17	8 - 16
Sheppard	17	1 - 9	60	fine sand	loamy fine sand	loamy fine sand	7.9 - 9.0	6.0 -20.0	0.05 - 0.08	< 2
Shiprock	10	0 - 5	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	2.0 - 6.0	0.05 - 0.12	0 - 4
Other soils, land types	15	-		-	-	-	-	-	-	-
12. Penistaja-Lohmiller-Travessilla										
Penistaja	35	3 - 5	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 8.4	0.6 - 6.0	0.09 - 0.16	< 2
Lohmiller	30	0 - 3	60	clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16
Travessilla	25	3 - 15	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
. Other soils, land types	10	-	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE Surface	Underlying Layer	Substratum	Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
13. Penistaja-Sheppard-Palma										
Penistaja	35	1 - 5	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 8.4	0.6 - 6.0	0.09 - 0.16	< 2
Sheppard	20	1 - 9	60	fine sand	loamy fine sand	loamy fine sand	7.9 - 9.0	6.0 -20.0	0.05 - 0.08	< 2
Palma	20	1 - 9	60	fine sandy loam	fine sandy loam	fine sandy loam	6.6 - 8.4	2.0 - 6.0+	0.08 - 0.14	< 2
Other soils, land types	25	-	-	-	-	-	-	-	-	-
14. Lohmiller-San Mateo										
Lohmiller	65	0 - 3	60	Clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16
San Mateo	25	0 - 3	60	sandy clay loam	fine sandy loam	fine sandy loam silty clay loam	7.9 - 8.4	0.2 - 2.0	0.13 - 0.19	< 2
Other soils, land types	10	-		-	-	-	-	-	-	-
15. Moriarty-Prewitt										
Moriarty	60	0 - 3	60	clay	clay	silty clay	7.9 - 8.4	< 0.06	0.12 - 0.14	1 - 4
Prewitt	20	0 - 3	60	loam	clay	fine sandy loam & clay loam	7.9 - 9.0	0.06 - 2.0	0.14 - 0.21	1 - 4
Other soils, land types	20	-		-	-	-	-	-	-	-

TABLE .3382-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE Surface	TEXTURE Underlying Layer	TEXTURE Substratum	Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
16. Hagerman-Travessilla										
Hagerman	35	1 - 5	20 - 40	sandy clay loam	sandy clay loam	sandstone	6.6 - 8.4	0.6 - 2.0	0.14 - 0.16	< 2
Travessilla	20	3 - 25	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
Rockland	20	25 - 75+	-	-	-	-	-	-	-	-
Other soils, land types	25	-	-	-	-	-	-	-	-	-
17. Rockland-Bond										
Rockland	40	5 - 75+	-	-	-	-	-	-	-	-
Bond	35	1 - 5	12 - 20	fine sandy loam	sandy clay loam	sandstone	6.6 - 8.4	0.2 - 2.0	0.11 - 0.16	< 2
Travessilla	15	5 - 25	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
Other soils, land types	10	-	-	-	-	-	-	-	-	-
18. Prieta-Thunderbird										
Prieta	30	0 - 10	10 - 20	stony loam	stony clay loam	basalt	6.6 - 8.4	0.06 - 2.0	0.08 - 0.11	< 2
Thunderbird	20	0 - 10	20 - 40	stony clay loam	clay	basalt	6.6 - 8.4	0.02 - 0.6	0.09 - 0.16	< 2
Rockland	30	-	-	-	-	-	-	-	-	-
Other soils, land types	20	-			-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (mmhos/cm)
				Surface	Underlying Layer	Substratum				
19. Thurloni-Savoia-Concho										
Thurloni	30	5 - 25	20 - 40	clay	silty clay	shale	7.4 - 9.0	0.06 - 0.6	0.13 - 0.17	2 - 4
Savoia	20	2 - 20	60	fine sandy loam	sandy clay loam	fine sandy loam	6.1 - 8.4	0.6 - 6.0	0.08 - 0.17	< 2
Concho	12	1 - 9	60	clay loam	sandy clay loam	sandy clay loam	7.4 - 8.4	0.2 - 2.0	0.10 - 0. 19	2 - 4
Rockland	10	15 - 75+	-	-	-	-	-	-	-	-
Other soils, land types	28	-	-	-	-	-	-	-	-	-
20. Argiborolls										
Aridic Argiborolls (fine)	55	20 - 40	30 - 50	cobbly clay loam	clay	shale	6.6 - 8.4	0.2 - 2.0	0.14 - 0.20	2 - 4
Aridic Argiborolls (fine-loamy)	20	20 - 40	30 - 50	cobbly clay loam	sandy clay loam	sandstone	6.6 - 8.4	0.6 - 2.0	0.13 - 0.19	< 2
Rockland	10	20 - 65+	-	-	-	-	-	-	-	-
Other soils, land types	15	-	-	-	-	-	-	-	-	-
21. Persayo-Farb										
Persayo	35	5 - 30	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Farb	35	5 - 30	10 - 20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.05 - 0.11	< 2
Sundown	10	1 - 9	60	loamy sand	loamy sand	loamy sand	7.4 - 8.4	6.0 -20.0	0.03 - 0.10	2 - 4
Shiprock	5	0 - 5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09 - 0.12	2 - 4
Badland	10	10 - 75+	-	-	-	-	-	-	-	-
Rockland	5	30 - 75+	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
22. Doak-Shiprock										
Doak	55	0 - 9	60	fine sandy loam	clay loam	loam	7.4 - 9.0	0.2 - 2.0	0.13 - 0.19	1 - 4
Shiprock	30	0 - 5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09 - 0.12	2 - 4
Other soils, land types	15	-	-	-	-	-	-	-	-	-
23. Shiprock Sheppard										
Shiprock	35	0 - 5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09 - 0.12	2 - 4
Sheppard	20	1 - 9	60	fine sand	loamy fine sand	loamy fine sand	7.9 - 9.9	6.0 -20.0	0.05 - 0.08	< 2
Nageezi	10	0 - 5	10 - 20	sandy loam	sandy loam	sandy loam	7.9 - 8.4	2.0 - 6.0	0.10 - 0.13	< 4
Kinnear	12	1 - 9	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 2.0	0.11 - 0.15	< 4
Camborthids	10	1 - 9	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 7.4	0.6 - 6.0	0.11 - 0.14	< 4
Other soils, land types	13	-		-	-	-	-	-	-	-
24. Badland-Rockland										
Badland	50	0 - 75+	-	-	-	-	-	-	-	-
Rockland	20	-	-	-	-	-	-	-	-	-
Alluvial Land	10	1 - 9	-	-	-	-	-	-	-	-
Persayo	5	5 - 30	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Other soils, land types	15	-	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
25. Camborthids-Farb										
Camborthids	50	1 - 9	20 - 40	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.08 - 0.13	< 2
Farb	30	3 - 30	10 - 20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.05 - 0.11	< 2
Other soils, land types	20	-	-	-	-	-	-	-	-	-
26. Persayo-Lohmiller										
Persayo	35	5 - 25	10 - 20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15 - 0.19	2 - 8
Lohmiller	30	0 - 3	60	clay loam	silty clay	clay loam	7.4 - 9.0	0.06 - 0.6	0.13 - 0.18	4 - 16
Badland	15	-	-	-	-	-	-	-	-	-
Other soils, land types	20	10 - 75+	-	-	-	-	-	-	-	-
27. Rockland-Travessilla										
Rockland	45	5 - 75+	-	-	-	-	-	-	-	-
Travessilla	35	5 - 30	6 - 20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06 - 0.17	< 2
Other soils, land types	20	-	-	-	-	-	-	-	-	-

TABLE .33B2-I (Continued)

PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soils Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
28. Billings-Badland Billings	35	0 - 5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06 - 0.2	0.14 - 0.19	2 - 4
Badland	20	30 - 75+	-	-	-	-	-	-	-	-
Farb	20	5 - 30	10 - 20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.05 - 0.11	< 2
Azfield	10	0 - 5	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.11 - 0.17	1 - 4
Other soils, land types	15	-	-	-	-	-	-	-	-	-

TABLE .33B2-II

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			Limitation For Use As:					Suitability As A Source Of:		
Soil or Land Type	Erosion Hazard	Shrink Swell	Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary * Landfills	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Argiborolls, fine	moderate	high	severe-depth, permeability	severe-steep slopes, stones	severe-depth, too stony	severe-depth steep slopes stones	shrink-swell, stones	poor-clayey, stones, slope	poor-too clayey	unsuited
Argiborolls, fine-loamy	moderate	moderate	severe-depth, steep slopes	severe-steep, slopes, stones	severe-depth too stony	severe-depth steep slopes, stones	steep slopes, stones	poor-stones, steep slopes	poor-shrink-swell, stones	unsuited
Azfield	moderate	moderate	slight	severe-seepage	moderate-seepage	severe-cut-banks cave	piping, easily eroded	fair-thin layer	fair-excess fines	unsuited
Badland	high	NO INTERPRETATIONS MADE								
Basalt Rockland	low	NO INTERPRETATIONS MADE								
Billings	moderate	moderate	severe-permeability	moderate-piping	moderate-too clayey	moderate-clayey	low strength, piping	fair-too clayey	poor-low strength, shrink-swell	unsuited
Bond	moderate	moderate	Severe-depth	severe-depth	severe-depth	severe-depth	thin layer	poor-thin layer	poor-thin layer	unsuited

TABLE .33B2-II (Continued)

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Soil or Land Type	Erosion Hazard	Shrink Swell	Limitation For Use As:					Suitability As A Source Of:		
			Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary Landfills *	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Cabezon	low	high	severe-depth, slope	severe-depth, slope	severe-depth	severe-depth	thin layer, shrink-swell	poor-thin layer, large stones	poor-thin layer, shrink-swell	unsuited
Camborthids	moderate	low	severe-depth	severe-depth seepage	severe-depth	severe-depth	thin layer, piping	fair-thin layer	poor-thin layer, depth	unsuited
Chipeta	moderate	high	severe-depth	severe-depth permeability	severe-depth	severe-depth	low strength, piping	poor-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Concho	moderate	moderate	moderate-permeability	1-7% moderate-seepage 7%+ severe-slope, seepage	moderate-too clayey	moderate-clayey	shrink-swell	fair-clayey	fair-clayey, shrink-swell	unsuited
Doak	moderate	moderate	severe-permeability	0-2% slight 2%+ moderate-slope	slight	slight	shrink-swell, low strength	fair-too clayey	poor-low strength	unsuited
Farb	high	low	severe-depth	severe-depth, seepage	severe-depth	severe-depth	piping, erodes easily	poor-thin layer	poor-thin layer	unsuited

TABLE .33B2-II (Continued)

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			Limitation For Use As:					Suitability As A Source Of:		
Soil or Land Type	Erosion Hazard	Shrink Swell	Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary * Landfills	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Gullied Land	high	NO INTERPRETATIONS MADE								
Hagerman	moderate	moderate	severe-depth	severe-depth	severe-depth	severe-depth	thin layer, low strength	poor-thin layer	poor-thin layer, low strength	unsuited
Las Lucas	moderate	moderate	severe-permeability	moderate-depth	moderate-depth	slight	piping, low strength	fair-too clayey	poor-low strength	unsuited
Litle	moderate	high	severe-depth permeability	severe-depth	severe-depth	severe-too clayey	compressible low strength	poor-thin layer, too clayey	poor-shrink-swell, low strength	unsuited
Lohmiller	moderate	high	severe-permeability	severe-floods	severe-too clayey	moderate-too clayey, floods	low strength, shrink-swell	fair-too clayey	poor-low strength, shrink-swell	unsuited
Moriarty	low	high	severe-permeability	severe-floods	moderate-floods, too clayey	moderate-floods, too clayey	low strength, compressible	poor-too clayey	poor-low strength, shrink-swell	unsuited

TABLE .3382-II (Continued)

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Soil or Land Type	Erosion Hazard	Shrink Swell	Limitation For Use As:						Suitability As A Source Of:		
			Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary Landfills *	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Navajo	low	high	severe-permeability, floods	severe-floods	severe-too clayey floods	severe-too clayey, floods	shrink-swell, low strength	poor-too clayey	poor-shrink-swell, low strength	unsuited
Palma	moderate	low	slight	moderate-seepage	moderate-seepage	slight	piping, seepage, low strength	good	fair-low strength	poor/ unsuited
Penistaja	moderate	moderate	slight	moderate-seepage	slight	slight	low strength, piping	fair	fair-low strength	unsuited
Persayo	high	high	severe-depth	severe-depth	severe-depth	moderate-depth	thin-layer, compressible	poor-thin layer, too clayey	poor-thin layer, shrink-swell	unsuited
Prewitt	moderate	high	severe-floods	severe-floods	moderate-floods	moderate-floods	piping, low strength	fair-too clayey	fair-low strength, shrink-swell	unsuited
Prieta	low	high	severe-depth	severe-depth	severe-depth	severe-depth	thin layer, piping, large stones	poor-stones	poor-thin layer, low strength	unsuited

TABLE .33B2-II (Continued)

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Soil or Land Type	Erosion Hazard	Shrink Swell	Limitation For Use As:					Suitability As A Source Of:		
			Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary * Landfills	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Rockland	low	NO INTERPRETATIONS MADE								
San Mateo	moderate	moderate	severe-floods	severe-floods	severe-floods	severe-floods	low strength, piping	fair	poor-low strength	unsuited
Savoia	moderate	moderate	moderate-slope	severe-seepage	severe-seepage	moderate-slope	favorable	fair	fair-low strength	unsuited
Sheppard	high	low	slight	severe-seepage	moderate-seepage	severe-cut-banks cave	seepage, piping	poor-too sandy	good	poor/ unsuited
Shiprock	moderate	low	slight	severe-seepage	moderate-seepage	slight	piping, seepage	fair	fair-low strength	poor/ unsuited
Thunderbird	low	high	severe-depth, permeability	severe-depth	severe-depth	severe-depth, too clayey	shrink-swell, thin layer	poor-too clayey, stones	poor-thin layer, shrink-swell	unsuited
Thurloni	moderate	high	severe-depth	severe-depth	severe-depth	severe-depth	shrink-swell, low strength	poor-too clayey, thin layer	poor-low strength shrink-swell	unsuited

TABLE .33B2-II

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Soil or Land Type	Erosion Hazard	Shrink Swell	Limitation For Use As:					Suitability As A Source Of:		
			Septic Tank Filter Fields	Sewage Lagoons Settling Ponds	Sanitary * Landfills	Shallow Excavations	Embankments	Topsoil	Roadfill	Sand/ Gravel
Torreon	low	high	severe-permeability	moderate-slope	severe-too clayey	severe-too clayey	low strength, compressible	fair-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Travessilla	high	low	severe-depth	severe-depth	severe-depth	severe-depth	piping, thin layer erodes easily	poor-thin layer	poor-thin layer	unsuited

* trench type
Source: USDA, SCS. "Guide for Interpreting Engineering Uses of Soils," November, 1971.

SABINOSA AREA

SAN JUAN

LEGEND

SOIL ASSOCIATIONS: San Juan Planning Unit

1. PERSAYO-FARB
2. WERLOW-FRUITLAND-TURLEY
3. DOAK-SHIPROCK
4. SHIPROCK-SHEPPARD
5. HILLY GRAVELLY LAND
6. BADLAND-ROCKLAND
7. TURLEY-BADLAND
8. PENISTAJA-PINAVETES-ROCKLAND
9. CHRISTIANBURG-NAVAJO
10. TURLEY-PERSAYO-BADLAND
11. VERMEJO-GALISTEO
12. ARGIBOROLLS
13. ARGIBOROLLS-ROCKLAND
14. TRAVESSILLA-ROCKLAND
15. DEL RIO-SILVER

SOIL ASSOCIATIONS OF THE SAN JUAN PLANNING AREA

A soil association is a distinctive, proportioned pattern of soils on the landscape. It usually consists of one or more major soils and at least one minor soil; it is named for the major soil. The soils in one association may occur in another, but in a different pattern.

Soil associations (and the General Soils Map) give a relative indication of the relationship of soils in the area. They are useful for comparing different parts of an area or in locating large tracts that are suitable for certain uses or have particular limitations to use. They are not suitable for planning the management or use of a specific location, because the soils in an association ordinarily differ in depth, texture, slope, and other characteristics.

Fifteen soil associations have been delineated in the San Juan Planning Area. A short description of each association follows, and must be used in conjunction with the "Table of Physical and Chemical Characteristic" and table of "Interpretation for Selected Uses of Major Soils". These tables provide specific information about each soil within an association, and list degrees and kinds of limitations for certain uses.

I. Soils of the Valley Bottoms, Floodplains, and Terraces

Vermejo-Galisteo   Christian-Navajo
Werlow-Fruitland-Turley

These soil associations occur adjacent to intermittent drainages and along river valleys. They are developing in fine to moderately coarse textured alluvium from sandstone and shale. Soils are deep (over 40 inches in depth) and have surface textures that range from loam to clay. Subsoil or subsurface material varies in texture from sandy loam to clay, and substratum material may include gravel and cobble. Water table levels generally fluctuate between two and seven feet. The soils are easily eroded, and deep, vertical-walled gullies occur in the immediate valley bottoms. Gravelly alluvium generally forms the divide between the valley bottoms and the uplands.

Inclusion of small areas with poor drainage and with salt accumulations are scattered throughout these soils. The fine-textured soils are usually alkali-affected and have slow permeability. Water table, alkalinity, shrink-swell, and piping hazard are the primary limitations to development and use of these soils.

II. Gently Sloping to Undulating Mesas, Upland Slopes and Alluvial Fans

Penistaja-Pinavetes-Rockland	Del Rio-Silver
Shiprock-Sheppard	Doak-Shiprock

These soils are developing in alluvial and eolian deposits on ancient stream terraces or alluvial fans, and deposits are relatively deep over sandstone or shale. Geologic erosion has left areas of these soils on elevated mesas and sideslopes. Surface textures range from loamy sand to light clay loam, and

substratums range in texture from loam to sand. Soils are over 60 inches in depth, with moderate to rapid permeability. Inclusions of shallow soils on sandstone or shale, soils with gravelly substrata, alkali-affected areas, and Rockland and Badland are present in small amounts.

III. Gently to Strongly Sloping and Undulating Upland Hillsides, Valley Sideslopes, Floodplains, and Alluvial Fans

Turley-Persayo-Badland
Persayo-Farb
Hilly Gravelley Land

Turley-Badland

These soils are developing on residual sandstone or shale, in alluvium from those same sources or in deep eolian sands. In general, the shallow and moderately deep soils (less than 40 inches deep over bedrock) are developing in the upland areas on hillsides and valley sideslopes. The deep, finer-textured soils usually occur on the intermittent floodplains and alluvial fans. Surface textures range from fine sand to clay, while substratums range from shale or sandstone bedrock to clay. Permeability is slow to moderate in the finer-textured soils, while coarser textured soils have moderate to rapid permeability. Correspondingly, the coarser-textured soils have low water holding capacity and are much more susceptible to wind erosion. High runoff rates occur on the shallow, clayey soils. Small inclusions of alkali-affected soils and very steep rock outcrop and escarpments are present. Gravelly, stratified alluvial soils also occur, particularly in the intermittent flood plains.

substratums range in texture from loam to sand. Soils are over 60 inches in depth, with moderate to rapid permeability. Inclusions of shallow soils on sandstone or shale, soils with gravelly substrata, alkali-affected areas, and Rockland and Badland are present in small amounts.

III. Gently to Strongly Sloping and Undulating Upland Hillsides, Valley Sideslopes, Floodplains, and Alluvial Fans

Turley-Persayo-Badland   Turley-Badland
Persayo-Fark
Hilly Gravelley Land

These soils are developing on residual sandstone or shale, in alluvium from these same sources or in deep eolian sands. In general, the shallow and moderately deep soils (less than 40 inches deep over bedrock) are developing in the upland areas on hillsides and valley sideslopes. The deep, finer-textured soils usually occur on the intermittent floodplains and alluvial fans. Surface textures range from fine sand to clay, while substratums range from shale or sandstone bedrock to clay. Permeability is slow to moderate in the finer-textured soils, while coarser textured soils have moderate to rapid permeability. Correspondingly, the coarser-textured soils have low water holding capacity and are much more susceptible to wind erosion. High runoff rates occur on the shallow, clayey soils. Small inclusions of alkali-affected soils and very steep rock outcrop and escarpments are present. Gravelly, stratified alluvial soils also occur, particularly in the intermittent flood plains.

IV. Moderately Sloping to Steep Rough Broken Land, Ridges, and Canyon sides, with Soils that are usually Cobbly and Stony.

Argiborolls
Argiborolls-Rockland

These soils are developing materials weathered from sedimentary rocks, primarily sandstone and shale. They are moderately deep to deep, and surface textures range from cobbly clay loam to cobbly stony sandy loam. Subsurface and subsoil textures range from cobbly or stony sandy clay loam to clay. Substratums are shale or sandstone bedrock at depths usually less than 50 inches. Permeability is slow to moderate. Inclusions of Rockland are common, and soils in the narrow valley areas are typically non-stony and deep. These areas are not extensive. Elevations range from 6200 feet to 8000 feet.

V. Moderately Sloping to Steep Canyon Sides and Rough Broken Land with Narrow Valley Floors, and Rockland

Travessilla-Rockland

This association is dominated by rough, broken topography and Rockland. The Rockland includes escarpments, steep canyon walls, rocky ridgetops, rock slides, rock ledges, and steep breaks, all of which are dominated by rock outcrop and small areas of highly variable soil. Parent materials are predominately sandstone and shale. Soils in the narrow valley bottoms are deep and highly variable. They include the Billings soils with clayey textures and slow permeability. Travessilla and Bond soils characterize the shallow soils, on moderately steep and rolling upland

benches, sideslopes and mesa tops. They have sandy textures and moderate to rapid permeability over sandstone. Scattered inclusions of Badland and Gullied land are part of the landscape.

VI. Gently Sloping to Very Steep Side Slopes on Nearly Barren Sandstone and Shale Exposures

Badland-Rockland

This assoication is the largest in San Juan County. Topography ranges from nearly level, narrow alluvial valley bottoms and rolling hills to very steep slopes on escarpments and breaks. It occurs where nearly barren exposures of sandstone and shale are prevalent. Badland is the most extensive land type and is forming in soft shale at differing stages of weathering. Soils in the narrow valley bottoms are usually stratified and vary widely in texture. Rockland includes escarpments, breaks, and steep mesa sideslopes. Small areas of highly variable soils are scattered throughout the Rockland. There are numerous intermittent drainage channels, and low intake rates and very slow permeability may reduce high runoff after normal rains. Much of the area is salt or alkali-affected.

Soil, Soil Association or Land Type	Percent of Associa-tion	Slope Per-cent	Depth to Bed-rock (in.)	TEXTURE			Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
1. Persyo-Farb										
Persayo	35	5-30	10-20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15-0.19	2 - 8
Farb	35	5-30	10-20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.05-0.11	< 2
Sundown	10	1-9	60	loamy sand	loamy sand	loamy sand	7.4 - 8.4	6.0 -20.0	0.03-0.10	2 - 4
Shiprock	5	0-5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09-0.12	2 - 4
Badland	10	10-75+	--	-----	-----	-----	-----	-----	-----	-----
Rockland	5	30-75+	--	-----	-----	-----	-----	-----	-----	-----
2. Werlow-Fruitland-Turley										
Werlow	25	0-3	60	loam	sandy clay loam	fine sandy loam	7.4 - 0.4	0.6 - 2.0	0.10-0.15	< 4
Fruitland	10	1-9	60	sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.08-0.17	< 4
Turley	15	0-5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06- 0.2	0.14-0.19	2 - 4
Azfield	15	1-5	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.11-0.17	< 4
Sundown	5	1-9	60	loamy sand	loamy sand	loamy sand	7.4 - 8.4	6.0 -20.0	0.03-0.10	2 - 4
Other soils, land types	30	--	--	-----	-----	-----	-----	-----	-----	-----
3. Doak-Shiprock										
Doak	55	0-5	60	fine sandy loam	sandy clay loam	loam	7.4 - 9.0	0.2 - 2.0	0.13-0.19	1 - 4
Shiprock	30	0-5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09-0.12	2 - 4
Other soils, land types	15	--	—	-----	-----	-----	-----	-----	-----	-----
4. Shiprock-Sheppard										
Shiprock	35	0-5	60	fine sandy loam	sandy loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.09-0.12	2 - 4
Sheppard	20	1-9	60	fine sand	loamy fine sand	loamy fine sand	7.9 - 9.0	6.0 -20.0	0.05-0.08	< 2
Nageezi	10	0-5	10-20	sandy loam	sandy loam	sandy loam	7.9 - 8.4	2.0 - 6.0	0.10-0.13	< 4
Kinnear	12	1-9	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 2.0	0.11-0.15	< 4
Camborthids	10	1-9	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 7.4	0.6 - 6.0	0.11-0.14	< 4
Other soils, land types	13	--	—	-----	-----	-----	-----	-----	-----	-----
5. Hilly gravelly land										
Hilly gravelly land	75	5-75	--	-----	-----	-----	-----	-----	-----	-----
Doak	5	0-5	60	loam	clay loam	loam	7.4 - 9.0	0.2 - 2.0	0.13-0.19	1 - 4
Grandview	5	0-5	60	loam	clay loam	loam	7.9 - 9.0	0.2 - 2.0	0.15-0.19	1 - 4
Other soils, land types	15	--	--	-----	-----	-----	-----	-----	-----	-----
6. Badland Rockland										
Badland	50	0-75+	--	-----	-----	-----	-----	-----	-----	-----
Rockland	20	—	--	-----	-----	-----	-----	-----	-----	-----
Alluvial land	10	1-9	--	-----	-----	-----	-----	-----	-----	-----
Persayo	5	5-30	10-20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15-0.19	2 - 8
Other soils, land types	15	--	--	-----	-----	-----	-----	-----	-----	-----

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (in.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
7. Turley - Badland										
Turley	35	0-5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06- 0.2	0.14-0.19	2 - 4
Badland	20	30-75+	—	-----	-----	-----	-----	-----	-----	-----
Farb	20	5-30	10-20	sandy loam	sandy loam	sandstone	7.4 - 8.4	2.6 - 6.0	0.05-0.11	<2
Azfield	10	0-5	60	fine sandy loam	sandy clay loam	sandy loam	7.4 - 8.4	0.6 - 6.0	0.11-0.17	1 - 4
Other soils, land types	15	--	--	-----	-----	-----	-----	-----	-----	-----
8. Penistaja-Pinavetes-Rockland										
Penistaja	45	3-5	60	fine sandy loam	sandy clay loam	sandy loam	6.6 - 8.4	0.6 - 6.0	0.09-0.16	-----
Pinavetes	25	3-9	60	loamy sand	loamy fine sand	sand, loamy sand	7.9 - 9.0	6.0 -20.0	0.05-0.08	0 - 2
Rockland	15	9-60	--	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	15	3-15	--	-----	-----	-----	-----	-----	-----	-----
9. Christianburg-Navajo		0-3								
Christianburg	40		60	clay	clay	clay	7.4 - 9.0	0.06- 0.6	0.13-0.18	4 - 8
Navajo	23		72	clay	clay	clay, silty clay	7.9 - 8.4	0.06- 0.6	0.14-0.16	8 -16
Gullied	15		--	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	22		—	-----	-----	-----	-----	-----	-----	-----
10. Turley-Persayo-Badland										
Persayo	35	5-25	10-20	silty clay loam	silty clay loam	shale	7.9 - 8.4	0.2 - 0.6	0.15-0.19	2 - 8
Turley	35	0-5	72	silty clay loam	clay loam	silty clay loam	7.4 - 9.0	0.06- 2.0	0.14-0.19	2 - 4
Badland	15	9-75	—	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	15	--	--	-----	-----	-----	-----	-----	-----	-----
11. Vermejo-Galisteo										
Vermejo	40	0-3	60	silty clay loam	silty clay	silty clay	7.9 - 9.0	0.06- 0.6	0.15-0.21	2 - 4
Galisteo	20	0-3	60	clay loam	silty clay	clay	7.9 - 9.0	0.06- 2.0	0.15-0.21	< 2
Manzano	10	0-5	60	loam	clay loam	loam	7.4 - 8.4	0.2 - 2.0	0.16-0.19	2 - 4
Gullied land	10	—	—	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	20	--	--	-----	-----	-----	-----	-----	-----	-----
12. Argiborolls										
Aridic Argiborolls (fine)	55	20-40	30-50	cobbly clay loam	clay	shale	6.6 - 8.4	0.2 - 2.0	0.14-0.20	2 - 4
Aridic Argiborolls (fine-loamy)	20	20-40	30-50	cobbly clay loam	sandy clay loam	sandstone	6.6 - 8.4	0.6 - 2.0	0.13-0.19	<2
Rockland	10	20-65+	--	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	15	—	—	-----	-----	-----	-----	-----	-----	-----

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (in.)	TEXTURE Surface	TEXTURE Underlying Layer	TEXTURE Substratum	Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
13. Argiborolls-Rockland										
Aridic Argiborolls (fine)	45	20-75+	30-50	cobbly clay loam	clay	shale	6.6 - 8.4	0.2 - 2.0	0.14-0.20	2 - 4
Rockland	40	30-75+	—	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	15	--	--	-----	-----	-----	-----	-----	-----	-----
14. Travessilla-Rockland										
Travessilla	40	3-25	6-20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0		<2
Rockland	25	30-75+	—	-----	-----	-----	-----	-----	-----	-----
Other soils, land types	55	--	—	-----	-----	-----	-----	-----	-----	-----
15. Del Rio-Silver										
Del Rio	45	1-9	60	loam	clay loam	loam, clay loam	7.4 - 8.4	0.2 - 2.0	0.17-0.17	<2
Silver	30	0-5	60	clay loam	clay loam	loam, clay loam	7.3 - 8.4	0.06- 2.0	0.16-0.20	<2
Travessilla	10	3-30	6-20	fine sandy loam	fine sandy loam	sandstone	7.4 - 8.4	2.0 - 6.0	0.06-0.17	<2
Other soils, land types	15	—	--	-----	-----	-----	-----	-----	-----	-----

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Prepared by: Tom Bargsten			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SILTING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Argiborolls, fine	moderate	high	severe-depth, permeability	severe-steep slopes, stones	severe-depth, too stoney	severe-depth, steep slopes, stones	shrink-swell, stones	poor-clayey, stones, slope	poor-too clayey	unsuited
Argiborolls, fine-loamy	moderate	moderate	severe-depth, steep slopes	severe-steep slopes, stones	severe-depth, too stoney	severe-depth, steep slopes, stones	steep slopes, stones	poor-stones, steep slopes	poor-shrink-swell, stones	unsuited
Badland	high	NO INTERPRETATIONS MADE								
Christianburg	moderate	high	severe-percs slowly	slight	severe-too clayey	severe-too clayey	low strength shrink-swell	poor-too clayey	poor-low strength, shrink-swell	unsuited
Del Rio	moderate	high	severe-permeability	moderate-slope	moderate - too clayey	slight	compressibility	fair-thin layer	poor-shrink-swell	unsuited
Doak	moderate	moderate	severe-permeability	0-2% slight 2%+ moderate-slope	slight	slight	shrink-swell low strength	fair-too clayey	poor-low strength	unsuited
Farb	high	low	severe-depth	severe-depth, seepage	severe-depth	severe-depth	piping, erodes easily	poor-thin layer	poor-thin layer	unsuited
Fruitland	moderate	low	slight	severe-seepage	slight	slight	piping, seepage, erodes easily	good	fair-low strength	poor-excess fines

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Prepared by: Tom Bargsten

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SILTING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Galisteo	low	high	severe-permeability	severe-floods	severe-floods	severe-floods	low strength, compressible	poor-thin layer	poor-shrink-swell, low strength	unsuited
Hilly gravelly land	moderate	NO INTERPRETATIONS MADE								
Navajo	low	high	severe-permeability, floods	severe-floods	severe-too clayey, floods	severe-too clayey, floods	shrink-swell low strength	poor-too clayey	poor-shrink-swell, low strength	unsuited
Penistaja	moderate	moderate	slight	moderate-seepage	slight	slight	low strength, piping	fair	fair-low strength	unsuited
Persayo	high	high	severe-depth	severe-depth	severe-depth	moderate-depth	thin-layer compressible	poor-thin layer, too clayey	poor-thin layer, shrink swell	unsuited
Pinavetes	high	low	slight	severe-seepage	moderate-seepage	severe - cut-banks cave	seepage, piping	poor-too sandy	good	poor/ unsuited
Rockland	low	NO INTERPRETATIONS MADE								
Sheppard	high	low	slight	severe-seepage	moderate-seepage	severe- cut-banks cave	seepage, piping	poor-too sandy	good	poor/ unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Prepared by: Tom Bargsten

			LIMITATION FOR USE AS:				SUITABILITY AS A SOURCE OF:			
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SILTING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Shiprock	moderate	low	slight	severe-seepage	moderate-seepage	slight	piping, seepage	fair	fair-low strength	poor/ unsuited
Silver	low	moderate	severe-permeability	moderate-slope	moderate - too clayey	moderate - too clayey	low strength, compressible	poor-too clayey	poor-low strength	unsuited
Travessilla	high	low	severe-depth	severe-depth	severe-depth	severe-depth	piping, thin layer erodes easily	poor-thin layer	poor-thin layer	unsuited
Turley	moderate	moderate	severe-permeability	moderate-piping	moderate-too clayey	moderate-clayey	low strength, piping	fair-too clayey	poor-low strength, shrink-swell	unsuited
Vermejo	high	high	severe-permeability	severe-floods	moderate-floods	severe-too clayey	piping, erodes easily	poor-too clayey excess salt	poor-shrink-swell, low strength	unsuited
Werlow	moderate	moderate	moderate-permeability	severe-seepage	moderate-seepage	moderate - cutbanks cave	piping, low strength	fair-thin layer	fair-shrink-swell	poor-excess fines

* trench type

Source: USDA, SCS. "Guide for Interpreting Engineering Uses of Soils," November, 1971.

SABINOSA AREA

SOUTHEAST OKLAHOMA

SOIL ASSOCIATIONS:
MAPS, TABLES, DESCRIPTIONS

Soil Associations of the Southeast Oklahoma URA

Introduction

The first portion of this report is the legend (or list) of soil associations discussed in the narrative (pages 1-20) and delineated on the general soils map. The narrative contains a brief description of the soils, including their physiographic position and principal use. The final portion includes tables giving physical/chemical properties of the soils with interpretations for selected uses; tables listing soil series with a flood hazard, high watertable, and high erosion hazard are also present, along with a bibliography of source material.

This report will enable initial consideration of the soil resource in planning efforts; however, on-site investigations must be made regarding specific use at given locations. Tables, soil maps, and narratives must be used together when making considerations that involve soils in the planning process.

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SOIL ASSOCIATIONS
SOUTHEAST OKLAHOMA URA

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Tuskahoma-Clebit-Wister Association

Tuskahoma-Sherwood-Clebit Association

Clebit-Tuskahoma Association

These associations are found on very gently sloping to moderately steep uplands. The Tuskahoma-Clebit-Wister Association occurs in southern LeFlore County and makes up about three percent of the county; the Tuskahoma-Sherwood-Clebit Association occurs in Pushmataha County and mades up about 30 percent of the county; and the Clebit-Tuskahoma Association occurs in Choctaw County and makes up about one percent of the county. Soils are shallow to deep and are developing in material weathered from sandstone and shale. Surface textures range from silty clay loam to gravelly fine sandy loam.

Most of the area is used for range and tame pasture; a few small areas are used for cultivated crops.

Burleson-Tarrant Association

This association occurs on nearly level to moderately steep uplands in southwestern Atoka County and makes up about three percent of the county. Burleson soils are deep and have developed in clayey alluvium. Tarrant soils are shallow over limestone bedrock; texture is a cobbly clay containing 35 to 85 percent by volume of limestone cobbles and pebbles.

This association is used primarily for range.

Hollywood-Swink Association

Hollywood-Ferris Association

The Hollywood-Swink Association occurs on very gently sloping to moderately steep uplands in Choctaw and southern McCurtain Counties. It occurs on 20 and 22 percent, respectively, of these counties. The Hollywood-Ferris Association also occurs in Choctaw County and makes up about two percent of the county. Holywood soils are deep and consist of silty clay throughout the profile. Swink soils are shallow and have clay surface layers containing up to 60 percent limestone fragments. Ferris soils are deep and have clay textures throughout the profile.

The surface is used for cultivated crops with small areas being used for range or tame pasture.

Ennis-Verdigris-Rosebloom Association

This association occurs on nearly level floodplains in Pittsburg County and makes up about eight percent of the county. The soils are deep and have surface layers of silt loam, underlain by silt loam and silty clay loam.

The surface is used for tame pasture, with about ten percent being used to grow cotton, corn, alfalfa, and grain sorghum.

Kaufman-Gowton Association

This association occurs on nearly level floodplains in southwestern Atoka County and makes up about three percent of the county. Kaufman soils are deep and consist of very dark gray clay. Gowton soils have a loam surface layer underlain by clay loam.

Most of the surface is used for tame pasture or cultivated crops.

Bernow-Muskogee-Bosville Association

Bernow-Bosville Association

These associations occur on nearly level to strongly sloping upland slopes. The Bernow-Muskogee-Bosville Association occurs in Choctaw County and makes up about 45 percent of the county; the Bernow-Bosville Association occurs in Atoka County and makes up about 30 percent of the county. The soils are deep and have surface layers of find sandy loam and silt loam underlain by silt loam, silty clay loam, and clay.

The surface is used for range and tame pasture.

Oklared-Redport-Moreland Association

This association occurs on nearly level to very gently sloping floodplains along the Arkansas River in northern LeFlore County, making up about three percent of the area. Oklared soils are deep and have a surface layer of sandy loam underlain by very

fine sandy loam. Redport soils are deep and have a silt loam surface underlain by silty clay loam. Moreland soils are also deep and consist of dark reddish-brown clay.

The soils of this association are the most intensely cultivated soils in the county.

Stigler-Vian-Bokoshe Association.

This association occurs on nearly level to gently sloping uplands in LeFlore County. The soils are deep and consist of silt loam underlain by silty clay loam and clay.

Most of the surface is used for tame pasture, though small areas are used to grow soybeans.

Bernow-Larue-Romia Association

The association is found on nearly level to moderately steep uplands in Pushmataha County and makes up about five percent of the county. Bernow and Larue soils are deep and have surface layers of loamy fine sand and fine sandy loam that are underlain by sandy clay loam. Romia soils are deep and have a surface layer of cobbly loamy fine sand. This is underlain by gravelly fine sand and sandy clay loam.

Most of the soils are used for woodland or tame pasture. Some areas underlain by Bernow and Larue soils are cultivated.

Severn-Oklared-Gallion Association

Karma-Oklared-Severn Association

These associations are found on nearly level to very gently sloping floodplains or terraces of the Red River. The Severn-Oklared-Gallion Association occurs in McCurtain County and makes up about three percent of the county, and the Karma-Oklared-Severn Association occurs in Choctaw County and makes up about five percent of the county. The soils are deep and have surface layers of fine sandy loam. This is underlain by fine sandy loam in the Severn soils, fine sandy loam and clay loam in the Karma soils, and fine sandy loam in the Oklared and Gallion soils.

Most of this surface is used to grow soybeans, cotton, grain sorghum, corn, peanuts, and small grains. The soils have few limitations that restrict their use and are among the most productive in the planning unit.

Talihina-Eram-Collinsville Association

This association occurs on gently sloping ridgetops and moderately steep uplands in Pittsburg County, and makes up 11 percent of the county. The soils are shallow to moderately deep, with loam to fine sandy loam surface layers underlain by loam or clay. They overlie shale or sandstone bedrock.

The surface is used for native range, with a few areas that are not too stony being used for tame pasture.

Vanoss-Choteau Association

This association occurs on nearly level to gently sloping uplands in the northern part of Pittsburg County, and makes up about two percent of the county. The soils are deep and consist of loam surface layers underlain by clay loam or sandy clay loam.

About 90 percent of the surface is under cultivation and the rest is used for tame pasture. Grain sorghum, soybeans, peanuts, cotton, and alfalfa are the main crops.

Dougherty-Stidham Association

This association occurs on nearly level to moderately steep uplands in the northern and central parts of Pittsburg County, and makes up about six percent of the county. The soils are deep and consist of loamy fine sand underlain by loamy fine sand to sandy clay loam.

About 50 percent of the surface is used as tame pasture; about 30 percent is used to grow truck crops, peanuts, and grain sorghum.

Yanola-Norwood Association

This association occurs on the nearly level floodplain of the South Canadian River in Pittsburg County and makes up less than

one percent of the county. The soils are deep and consist of fine sandy loam and silt loam.

About 90 percent of this association is under cultivation and the rest is used for tame pasture. Alfalfa, corn, grain sorghum, and soybeans are the main crops.

Crockett-Burleson-Wilson Association

This association is found on nearly flat to gently sloping uplands in the southwestern part of Coal County, and makes up about five percent of the county. The soils are deep and consist of clay or silt loam surface layers underlain by clay.

Most of the surface is used for cultivated crops, tame pasture, and range.

Lanton-Ennis-Robinsonville Association

Lanton-Kaufman-Robinsonville Association

These associations occur on nearly level to gently sloping floodplains in Coal County. The Lanton-Ennis-Robinsonville Association makes up about eight percent of the county and the Lanton-Kaufman-Robinsonville Association makes up about five percent of the county. The Lanton, Ennis, and Robinsonville soils are deep and have loam surface layers underlain by brown silt loam and fine sandy loam. This overlies silty loam or fine sandy loam. Kaufman soils consist of very dark gray silty clay.

Most of the Lanton-Ennis-Robinsonville Association is used for tame pasture, range, or woodland, while most of the Lanton-Kaufman-Robinsonville Association is cultivated.

Homa-Rock Outcrop Association

Talpa-Rock Outcrop Association

These associations occur on moderately steep to steep uplands in Coal County, and make up 15 percent and 2 percent respectively of the county. Homa soils are deep and consist of a surface layer of fine sandy loam underlain by clay. Talpa soils are shallow and consist of silty clay loam and gravelly silty clay loam. The rock outcrop is composed of limestone and sandstone.

Most of the surface is used for range.

Hartsells-Homa Association

This association occurs on very gently sloping to moderately sloping uplands in Coal County and makes up about 28 percent of the county. The soils are moderately deep and consist of fine sandy loam underlain by sandy clay loam and clay.

Most of the surface is used for range and tame pasture. Small areas are used for cultivated crops.

Bonham-Bates-Parsons Association

Dennis-Parsons-Bates Association

These associations occur on gently sloping uplands. The Bonham-Bates-Parsons makes up about 35 percent of Coal County; the Dennis-Parsons-Bates makes up about 19 percent in Pittsburg County. The soils are deep and consist of fine sandy loam and silty loam underlain by loam, clay loam, and clay.

About 90 percent of the surface is used for tame pasture, and about 10 percent is under cultivation.

Goldston-Carnasaw-Sacul Association

This association occurs on moderately steep to steep uplands in McCurtain County and makes up 31 percent of the county. Goldston soils have a surface layer of gravelly loam, underlain by gravelly loam with 38 to 55 percent content of sandstone and shale fragments. Carnasaw and Sacul soils have stony loam surface layers underlain by clay and silty clay.

Almost all of the surface consists of woodlands, with a few small areas of tame pasture.

Carnasaw-Sherwood Association

This association occurs on very gently sloping to moderately steep uplands in McCurtain County, and makes up 16 percent of the county. The soils are deep and consist of a surface layer of

fine sandy loam or loam underlain by silty clay loam, clay, or gravelly clay loam.

The soils in this association are about equally divided between woodland and tame pasture; small areas are used to grow cultivated crops.

Pledger-Roebuck-Redlake Association

Pledger-Roebuck Association

These associations are found on nearly level floodplains of the Red River. The Pledger-Roebuck-Redlake Association occurs in southern McCurtain County and makes up about four percent of the County. The Pledger-Roebuck Association occurs in Choctaw County and makes up about five percent of the county. The soils are deep and have surface clay. This overlies silty clay loam.

Most of the surface is used for cultivated crops. Soybeans, cotton, grain sorghum, corn, and small grains are the major crops.

Pickens-Alikchi Association

This association is found on nearly level to steep uplands in McCurtain County, and makes up about five percent of the county. Pickens soils are shallow over shale and have surface layers of shaly silt loam underlain by very shaly silt loam, 75 percent of

which consists of shale fragments. Alikchi soils are moderately deep, with loam surface textures underlain by silty clay loam.

Most of the surface is used for woodland or native range.

Felker-Kullit Association

This association occurs on nearly level to very gently sloping uplands in southern McCurtain County, and makes up about six percent of the county. The soils are deep and consist of fine sandy loam underlain by silt loam or sandy clay loam. This overlies silty clay loam or sandy clay.

The surface is used primarily for woodland or tame pasture, with a few small areas being used to grow corn, grain sorghum, and soybeans.

Kinta-Wrightsville Association

This association occurs on nearly level to very gently sloping uplands and terraces in southern McCurtain County, and makes up five percent of the county. These soils are deep and have clay loam to silt loam surface layers underlain by clay or silty clay.

Most of the surface is used for woodland or tame pasture; a few small areas are cultivated.

Ruston-Tiak-Saffell Association

Ruston-Boggy-Saffell Association

These associations occur on very gently sloping to moderately steep upland slopes. The Ruston-Tiak-Saffell Association makes up 19 percent of southern McCurtain County; Ruston-Boggy-Saffell soils make up about two percent of Pushmataha County. The soils are deep and have fine sandy loam surface layers underlain by find sandy loam or gravelly sandy clay loam (Ruston, Boggy, and Saffell soils) or by clay (Tiak soils).

These associations are used primarily for tame pasture, with small areas of woodland and cropland.

Honobia-Nashoba Association

This association occurs on strongly sloping to moderately steep uplands in Pushmataha County making up about two percent of the county. Soils are moderately deep to deep and have surface layers of stony fine sandy loam or stony sandy loam underlain by clay to stony sandy loam. They overlie shale (Honobia) or sandstone (Nashoba).

Soils are used primarily for range or pasture.

Dela-Guyton-Pushmataha

This association occurs on nearly level to very gently sloping flood plains and stream terraces. It makes up about two percent of Pushmataha County. Soils are deep and have surface layers of sandy loam to silt loam, and are underlain by fine sandy loam, silt loam, or silty clay loam.

This association is used for tame pasture and areas of cultivated cropland.

Rexor-Guyton Association

Guyton-Ochlockonee Association

Guyton-Neff-Rexor Association

Guyton-Rexor-Dela

Guyton-Rexor-Boggy Association

Boggy-Guyton Association

These associations are found on nearly level to gently sloping floodplains and terraces in parts of six counties. The Rexor-Guyton Association occurs in Haskell County and makes up about eight percent of the county; the Guyton-Rexor-Dela Association occurs in Latimer County and makes up about four percent of the county; the Guyton-Ochlockonee Association occurs in southern McCurtain County and makes up about seven percent of the county; the Guyton-Neff-Rexor Association occurs in LeFlore County and makes up about seven percent of the county; the

Guyton-Rexor-Boggy Association occurs in Atoka County and makes up about three percent of the county, and the Boggy-Guyton Association occurs in Choctaw County and makes up about five percent of the county. Rexor, Neff, and Guyton soils are deep and have silt loam surface layers underlain by silty clay loam. This overlies silty clay loam. Ochlockonee soils consist of fine sandy loam underlain by fine sandy loam. Dela soils have surface layers of fine sandy loam underlain by sand. Boggy soils are deep with fine sandy loam textures.

Most of the surface is used as tame pasture; a few small areas are cultivated. The soils are subject to moderate to severe limitations because of seasonal overflow.

Tuskahoma-Wister-Sobol Association
Sobol-Tuskahoma-Wister Association

These associations are found on very gently sloping to moderately steep uplands. The Tuskahoma-Wister-Sobol Association occurs in Latimer County and makes up about four percent of the county, and the Sobol-Tuskahoma-Wister Association occurs in Pushmataha County and makes up about two percent of the county. The soils have a surface layer of loam or silt loam. Below that, the shallow Tuskahoma soils have clay and shaly clay; moderately deep Sobol soils have clay; and the deep Wister soils have silty clay.

The surface is used primarily for range and tame pasture. Tuskahoma and Wister soils are moderately suited for cultivation and Sobol soils are poorly suited to unsuited for cultivation.

Liberal-Collinsville Association

This association occurs on very gently sloping to moderately steep uplands in Haskell and Latimer Counties, and makes up five percent and four percent, respectively, of the counties. The Collinsville soils have a surface layer of stony loam underlain by loam. Liberal soils have a surface layer of clay loam underlain by clay containing up to 50 percent shale fragments.

Most of the association is used for range and tame pasture.

Hopco-Trinity-Kaufman Association

This association occurs on nearly level to gently sloping floodplains in Choctaw County and makes up about three percent of the county. Trinity and Kaufman soils are deep and consist of silty clay loam underlain by clay.

Most of the surfaces is used for tame pasture.

Chigley-Agan Association

The association occurs on nearly level to strongly sloping uplands in western Atoka County and makes up about one percent of the county. Chigley soils have a surface layer of gravelly sandy

loam underlain by clay loam, clay, or gravelly clay. Agan soils have a surface layer of loam underlain by clay to very gravelly clay. The soils are deep.

Most of the surface is used as range and tame pasture.

Tenaha-Smithdale Series

This association occurs on gently sloping to moderately steep uplands in northeastern Choctaw County and makes up about 12 percent of the county. These soils are moderately deep to deep. Tenaha soils have surface layers of loamy fine sand underlain by sandy loam and sandy clay loam. Smithdale soils consist of sandy loam, underlain by sandy clay loam and sandy loam.

Most of the association is used for southern pine woodland, with small areas being used for native range or cultivated crops.

Dennis-Eram Association

The association occurs on very gently sloping to moderately steep uplands in Atoka County and makes up about 20 percent of the county. Dennis soils have a surface layer of silt loam underlain by silty clay loam and clay. Eram soils have a surface layer of clay loam underlain by clay.

The surface is used primarily for cultivated crops, tame pasture, and native range. Small grains, grain sorghum, corn, soybeans, and cotton are the main crops.

Carnasaw-Octavia-Pirum Association

Carnasaw-Pirum-Clebit Association

Carnasaw-Clebit-Bengal Association

These associations are found on moderately steep to steep uplands. The Carnasaw-Octavia-Pirum Association occurs in LeFlore County and makes up about 45 percent of the county; the Carnasaw-Pirum-Clebit Association occurs in Pushmataha County and makes up about 45 percent of that county; the Carnasaw-Clebit-Bengal Association occurs in Latimer County and makes up about 40 percent of the county; Clebit soils are shallow and consist of gravelly fine sandy loam and gravelly loam. Pirum soils are moderately deep; the other soils are deep. These soils have surface layers of fine sandy loam underlain by gravelly clay. Small to large stones are present on the soil surfaces and within the soils.

Most of the association consists of woodland.

Enders-Hector Association

Enders-Hector-Linker Association

The Enders-Hector Association occurs on very gently sloping to steep uplands in Atoka, Haskell, and Latimer Counties. It makes up about 40 percent of Atoka County, 35 percent of Haskell County, and 30 percent of Latimer County. The Enders-Hector-Linker Association occurs in LeFlore County and

makes up about 20 percent of the county. Enders soils are deep and have a surface layer of loam underlain by clay. Hector soils are shallow, and Linker soils are moderately deep. They have surface layers of loam and fine sandy loam underlain by loam and sandy clay loam. Rock fragments three to 18 inches in diameter cover up to 20 percent of the soil surface and are abundant within the soils.

Most of the surface is used as woodland or wooded range.

Steedman-Collinsville Association

This association occurs on very gentle to steep slopes in the north-central part of Coal County, and makes up about two percent of the county. The soils are shallow to moderately deep and consist of fine sandy loam to clay loam, underlain by gravelly fine sandy loam (Collinsville soils) and clay (Steedman soils).

Most of the surface is used for range and tame pasture. The soils are unsuitable for cultivation or woodland management because of the steep slopes and very severe erosion potential.

Crevasse-Oklared Association

This association occurs on nearly level or very gently sloping floodplains of the Canadian and Arkansas Rivers in northern Haskell County, and make up three percent of the county. The soils are deep and consist of loamy fine sand, sandy loam, or sand.

The surface is used for cultivated crops (Oklared) and tame pasture (Crevasse).

Enders-Hector-Hartsells Association

This association occurs on smooth hilltops, steep bluffs, and rough, stony, hilly areas in Pittsburg County, and makes up 53 percent of the county. The soils are shallow to moderately deep and consist of fine sandy loam surface layers underlain by fine sandy clay loam or clay.

About 85 percent of the surface is forested and about 15 percent is used as range and tame pasture.

Yanush-Bigfork Association

The association occurs on very gently sloping to steep uplands in Latimer and Pushmataha Counties and makes up three percent and two percent, respectively, of the counties. The soils are moderately deep to deep and have surface layers of cherty silt loam (Bigfork soils) and stony silt loam (Yanush soils) underlain by very cherty silty clay loam. Chert fragments make up 20 to 60 percent, by volume, of Yanush soils and 50 to 60 percent of Bigfork soils. Bigfork soils overlie chert bedrock.

Most of the association is used for tame pasture or woodland. A few small areas of Yanush soils are used to grow wheat and oats.

Linker-Naldo Association

Linker-Naldo-Sallisaw Association

These associations are found on nearly level to sloping uplands. The Linker-Naldo Association occurs in Haskell County and makes up 17 percent of the county while the Linker-Naldo-Sallisaw Association occurs in Latimer County and makes up about five percent of the county. The soils are deep and consist of fine sandy loam underlain by sandy clay loam or clay loam. Sallisaw soils have gravelly substratums.

Most of the surface is used for range and time pasture.

Stigler-Counts Association

Stigler-Counts-Tamaha Association

These associations are found on nearly level to moderately steep uplands. The Stigler-Counts Association occurs in Latimer County and makes up about ten percent of the county, and the Stigler-Counts-Tamaha Association occurs in Haskell County and makes up 32 percent of the county. The soils are deep and have surface layers of silt loam underlain by silty clay or silty clay loam. This overlies clay.

Most of the surface is used for range and tame pasture.

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
HASKELL COUNTY										
1. Linker-Naldo										
Linker	55	1-9	20-40	fine sandy, loam, stony fine sandy loam	fine sandy loam, sandy clay loam	gravelly sandy clay loam, shale	3.6-5.5	0.6-2.0	0.11-0.20	--
Naldo	20	0-5	60+	fine sandy loam	clay loam, sandy clay loam	clay loam, sandy clay loam	4.5-6.5	0.6-2.0	0.11-0.20	--
2. Enders-Hector										
Enders	55	2-45	40-62	stony very fine sandy loam	stony silty clay loam	silty clay, clay	3.6-5.5	<0.06-2.0	0.11-0.20	--
Hector	30	2-50	10-20	gravelly fine sandy loam	gravelly fine sandy loam	sandstone	4.5-6.5	2.0-6.0	0.08-0.15	--
3. Stigler-Counts-Tamaha										
Stigler	32	1-3	60+	silt loam	silty clay, silty clay loam	silty clay, silty clay loam	4.5-7.8	<0.06-2.0	0.13-0.22	--
Counts	18	0-5	60+	loam, silt loam	clay, silty clay loam	clay, silty clay loam	4.5-8.4	<0.06-2.0	0.12-0.24	--
Tamaha	11	1-8	60+	silt loam	silt loam, silty clay loam	clay	4.5-7.3	<0.06-2.0	0.14-0.24	--
4. Liberal-Collinsville										
Liberal	50	2-30	20-50	silt loam, clay loam	silty clay loam	clay, shale	4.5-8.4	0.06-2.0	0.12-0.22	--
Collinsville	15	5-30	4-20	fine sandy loam, stony fine sandy loam	fine sandy loam, loam, stony fine sandy loam	sandstone	5.1-6.5	2.0-6.0	0.09-0.16	--
5. Rexor-Guyton										
Rexor	67	0-1	60+	loam, silt loam	clay loam	silt loam	4.5-6.0	0.6-2.0	0.15-0.24	yes
Guyton	25	0-2	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

	Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
					Surface	Underlying Layer	Substratum				
6.	Crevasse-Oklared										
	Crevasse	21	0-5	60+	loamy fine sand	fine sand	fine sand	6.6-8.4	6.0-20.0	0.04-0.15	yes
	Oklared	18	0-2	60+	fine sandy loam	fine sandy loam	very fine sandy loam	7.4-8.4	2.0-20.0	0.10-0.16	yes
	COAL COUNTY										
7.	Lanton-Ennis-Robinsonville										
	Lanton	50	0-3	60+	silt loam	silty clay loam	clay	6.1-7.3	0.06-2.0	0.15-0.19	yes
	Ennis	15	0-1	60+	loam	silt loam, loam	silty clay loam	5.1-6.5	0.6-2.0	0.12-0.19	yes
	Robinsonville	15	0-1	60+	loam	loam	fine sandy loam	5.1-6.5	2.0-6.0	0.09-0.16	yes
8.	Crockett-Burleson-Wilson										
	Crockett	28	0-5	60+	loam	clay	clay	5.6-7.8	<0.06-2.0	0.12-0.16	--
	Burleson	25	0-5	--	--	--	--	--	--	--	--
	Wilson	15	0-1	60+	silt loam	clay	clay	5.6-8.4	<0.06-2.0	0.14-0.17	--
9.	Homa-Rock Outcrop										
	Homa	65	5-15	60+	fine sandy loam	clay	clay	4.5-8.4	0.06-6.0	0.09-0.18	--
	Rock Outcrop	12	15-50	--	--	--	--	--	--	--	--
10.	Hartsells-Homa										
	Hartsells	42	2-9	20-40	fine sandy loam	fine sandy loam	sandy clay loam, channery sandy loam	3.6-5.5	0.6-6.0	0.10-0.18	--
	Homa	28	2-9	60+	fine sandy loam	clay	clay	4.5-8.4	0.06-6.0	0.09-0.18	--
11.	Talpa-Rock Outcrop										
	Talpa	55	5-30	5-20	silty clay loam	gravelly silty clay loam	limestone	6.6-8.4	0.6-0.2	0.13-0.19	--
	Rock Outcrop	25	5-50	--	--	--	--	--	--	--	--
12.	Steedman-Collinsville										
	Steedman	70	2-30	25-40	clay loam	clay	shale	5.1-8.4	0.06-0.6	0.14-0.19	--
	Collinsville	20	5-30	4-20	fine sandy loam, stony fine sandy loam	fine sandy loam, stony fine sandy loam, loam	sandstone	5.1-6.5	2.0-6.0	0.09-0.16	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
13. Bonham-Bates-Parsons										
Bonham	30	2-5	60+	loam	clay loam	clay	5.1-7.8	0.06-2.0	0.12-0.18	--
Bates	15	2-5	20-40	silt loam, fine sandy loam	loam, clay loam, sandy clay loam	sandstone and shale	5.1-6.5	0.6-2.0	0.15-0.22	--
Parsons	12	0-2	60+	silt loam	silt loam, clay	clay	5.1-7.8	<0.06-2.0	0.14-0.24	--
14. Lanton-Kaufman-Robinsonville										
Lanton	55	0-5	60+	silt loam	silty clay loam	clay	6.1-7.3	0.06-2.0	0.15-0.19	yes
Kaufman	20	0-2	60+	clay	clay	clay	5.6-7.8	<0.06	0.15-0.20	yes
Robinsonville	20	0-1	60+	loam	loam	fine sandy loam	5.1-6.5	2.0-6.0	0.09-0.16	yes
McCURTAIN COUNTY										
15. Carnasaw-Sherwood										
Carnasaw	44	2-30	42	loam	silty clay	sandstone and shale	4.5-6.0	0.06-2.0	0.08-0.20	--
Sherwood	24	2-5	50-60	fine sandy loam	clay loam, gravelly clay loam	sandstone and shale	4.5-6.0	0.6-6.0	0.08-0.20	--
16. Goldston-Carnasaw-Sacul										
Goldston	35	15-30	20-40	gravelly loam, gravelly silt loam	very gravelly loam	shale	4.5-6.0	2.0-6.0	0.06-0.13	--
Carnasaw	30	15-30	42	loam	silty clay	sandstone and shale	4.5-6.0	0.06-2.0	0.08-0.20	--
Sacul	18	5-15	60+	loam, fine sandy loam	clay, silty clay	silty clay loam, shale	4.5-6.0	0.06-2.0	0.10-0.19	--
17. Pickens-Alikchi										
Pickens	46	2-30	10-20	shaly silt loam	very shaly silty clay loam	hard shale	4.5-6.5	0.6-2.0	0.06-0.14	--
Alikchi	10	0-1	30-40	loam, silt loam	silty clay loam	fractured shale	5.1-7.3	0.06-2.0	0.15-0.24	yes
18. Hollywood-Swink										
Hollywood	35	2-5	72+	clay loam	silty clay	silty clay, clay	6.1-8.4	<0.06-0.6	0.12-0.22	--
Swink	30	2-30	10-20	clay, stony clay	clay, silty clay loam	limstone, shale	6.6-8.4	0.06-0.2	0.07-0.12	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

	Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
					Surface	Underlying Layer	Substratum				
19.	Ruston-Tiak-Saffell										
	Ruston	24	2-30	60+	fine sandy loam, gravelly fine sandy loam	fine sandy loam, sandy clay loam	sandy clay loam	4.5-6.5	0.6-2.0	0.09-0.17	--
	Tiak	16	2-15	60+	fine sandy loam, gravelly sandy loam	clay	clay	4.5-5.0	0.06-2.0	0.07-0.18	--
	Saffell	10	2-15	60+	gravelly fine sandy loam	gravelly sandy clay loam	gravelly sandy loam	4.5-5.5	0.6-6.0	0.04-0.15	--
20.	Kinta-Wrightsville										
	Kinta	24	0-3	60+	clay loam	clay	clay	4.5-5.5	<0.06-0.6	0.14-0.20	--
	Wrightsville	16	0-1	60+	silt loam	silty clay	silty clay	3.6-8.4	<0.06-0.6	0.14-0.22	--
21.	Felker-Kullit										
	Felker	66	0-2	60+	loam	silty clay loam, silt loam	silty clay loam	4.5-6.0	0.2-2.0	0.15-0.22	--
	Kullit	18	2-5	60+	fine sandy loam	sandy clay loam	sandy clay	4.5-6.5	0.2-6.0	0.11-0.15	--
22.	Pledger-Roebuck-Redlake										
	Pledger	39	0-2	60+	clay	clay	clay	6.1-8.4	<0.06-0.2	0.12-0.22	yes
	Roebuck	26	0-1	60+	clay, silty clay	clay, silty clay	clay, silty clay	6.1-8.4	<0.06	0.12-0.20	yes
	Redlake	17	0-1	60+	silty clay, clay	clay	clay loam	7.4-8.4	<0.06-0.2	0.12-0.20	yes
23.	Severn-Oklared-Gallion										
	Severn	27	0-5	60+	very fine sandy loam	very fine sandy loam	very fine sandy loam	7.4-8.4	2.0-6.0	0.13-0.17	--
	Oklared	20	0-2	60+	fine sandy loam	fine sandy loam	very fine sandy loam	5.6-7.8	2.0-20.0	0.10-0.16	yes
	Gallion	19	0-1	60+	very fine sandy loam	loam, sandy clay loam	very fine sandy loam, loam, clay loam		0.6-2.0	0.13-0.19	--
24.	Guyton-Ochlockonee										
	Guyton	28	0-2	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
	Ochlockonee	14	0-2	60+	sandy loam	fine sandy loam	very fine sandy loam	4.5-5.5	2.0-6.0	0.07-0.14	yes

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

	Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
					Surface	Underlying Layer	Substratum				
	PITTSBURG COUNTY										
25.	Yahola-Norwood										
	Yahola	65	0-2	60+	fine sandy loam	fine sandy loam	silt loam	7.4-8.4	2.0-6.0	0.11-0.15	--
	Norwood	30	0-2	60+	silt loam, silty clay loam	silt loam, silty clay loam	silt loam and very fine sandy loam	7.4-8.4	0.6-2.0	0.15-0.22	yes
26.	Dougherty-Stidham										
	Dougherty	65	2-8	60+	loamy fine sand	sandy clay loam	sandy loam, loamy fine sand	5.1-6.0	0.6-6.0	0.06-0.13	--
	Stidham	30	0-3	60+	loamy fine sand	sandy clay loam	fine sandy loam, loamy fine sand	5.1-6.5	0.6-6.0	0.06-0.16	--
27.	Enders-Hector-Hartsells										
	Enders	40	9-50	40-60	gravelly very fine sandy loam	silty clay loam, silty clay	weathered shale	3.6-5.5	<0.06-2.0	0.08-0.20	--
	Hector	40	9-50	10-20	gravelly fine sandy loam	gravelly fine sandy loam	sandstone	4.5-6.5	2.0-6.0	0.08-0.17	--
	Hartsells	15	2-15	20-40	fine sandy loam	fine sandy loam	sandy clay loam, channery sandy loam	3.6-5.5	0.6-6.0	0.10-0.18	--
28.	Ennis-Verdigris-Rosebloom										
	Ennis	37	0-2	60+	loam	silt loam, loam	silty clay loam	5.1-6.5	0.6-2.0	0.12-0.19	--
	Verdigris	27	0-2	60+	silt loam	silt loam	silt loam	5.1-7.3	0.2-0.6	0.12-0.16	yes
	Rosebloom	15	0-2	60+	silt loam	silt loam	silty clay loam	4.5-6.0	0.06-0.6	0.11-0.15	yes
29.	Dennis-Parsons-Bates										
	Dennis	40	0-5	60+	silt loam, loam	silty clay loam	clay, silty clay	4.5-8.4	0.06-0.6	0.14-0.19	--
	Parsons	16	0-2	60+	silt loam	silt loam clay	clay	5.1-7.8	0.06-2.0	0.14-0.22	--
	Bates	14	2-5	20-40	silt loam, fine sandy loam	clay loam, sandy clay loam	sandstone and shale	5.1-6.5	0.6-2.0	0.15-0.22	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
30. Talihina-Eram-Collinsville										
Talihina	45	5-30	10-20	clay, stony clay	clay	shale	5.1-7.8	0.06-0.2	0.10-0.17	--
Eram	30	1-5	20-40	clay loam	clay	shale	5.1-7.3	0.06-0.6	0.14-0.19	--
Collinsville	15	9-30	4-20	stony fine sandy loam, fine sandy loam	fine sandy loam, stony fine sandy loam	sandstone	5.1-6.5	2.0-6.0	0.09-0.16	--
31. Vanoss-Choteau										
Vanoss	40	1-3	60+	loam	clay loam	sandy clay loam	5.1-7.3	0.6-2.0	0.11-0.18	--
Choteau	30	0-5	60+	loam	clay loam	clay	4.5-7.8	0.06-2.0	0.12-0.18	
LEFLORE COUNTY										
32. Oklared-Redport-Moreland										
Oklared	35	0-5	60+	fine sandy loam	fine sandy loam	very fine sandy loam	7.4-8.4	2.0-20.0	0.10-0.16	yes
Redport	35	0-1	60+	silty clay loam, silty loam	silty clay loam	silty clay loam	7.4-8.4	0.6-2.0	0.15-0.24	yes
Moreland	20	0-2	60+	silty clay loam	silty clay	silty clay, clay	6.1-8.4	<0.06-2.0	0.18-0.23	--
33. Stigler-Vian-Bokoshe										
Stigler	35	1-3	60+	silt loam	silty clay	silty clay	4.5-7.8	<0.06-2.0	0.13-0.22	--
Vian	20	1-5	60+	silt loam	silt loam	silty clay loam	4.5-6.0	0.2-2.0	0.16-0.20	--
Bokoshe	15	0-5	60+	loam	clay loam	clay loam	4.5-6.5	0.6-2.0	0.11-0.20	--
34. Guyton-Neff-Rexor										
Guyton	20	0-2	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
Neff	45	0-3	60+	silt loam, loam	loam, silt loam, clay loam	silty clay loam, silt loam, loam	4.5-8.0	0.2-2.0	0.15-0.22	yes
Rexor	20	0-5	60+	loam, silt loam	clay loam	silt loam	4.5-6.0	0.6-2.0	0.15-0.24	yes
35. Enders-Hector-Linker										
Enders	65	9-50	40-60	gravelly very fine sandy loam	silty clay loam, silty clay	weathered shale	3.6-5.5	<0.06-2.0	0.08-0.20	--
Hector	20	9-50	10-20	gravelly fine sandy loam	gravelly fine sandy loam	sandstone	4.5-6.5	2.0-6.0	0.08-0.17	--
Linker	15	9-15	20-40	fine sandy loam, stony fine sandy loam	sandy clay loam	gravelly sandy clay loam, shale	3.6-5.5	0.6-2.0	0.11-0.20	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
36. Tuskahoma-Clebit-Wister										
Tuskahoma	40	2-5	10-20	loam, silty clay loam	shaly clay	shale	5.1-7.8	<0.06-2.0	0.06-0.16	--
Clebit	20	2-5	10-20	gravelly fine sandy loam	gravelly loam	sandstone	4.5-7.0	2.0-6.0	0.06-0.11	--
Wister	35	2-5	40-60	silt loam	silty clay, clay	soft shale	4.5-8.4	<0.06-2.0	0.14-0.24	--
37. Carnasaw-Octavia-Pirum										
Carnasaw	--	15-50	42	loam	silty clay	sandstone, shale	4.5-6.0	0.06-2.0	0.08-0.20	--
Octavia	--	15-30	60+	gravelly fine sandy loam	gravelly clay loam	gravelly clay	4.5-6.0	0.06-2.0	0.04-0.18	--
Pirum	--	5-30	22-50	fine sandy loam	sandy clay loam	sandstone	4.5-5.5	0.6-2.0	0.12-0.18	--
LATIMER COUNTY										
38. Enders-Hector										
Enders	--	2-45	40-62	stony very fine sandy loam	stony silty clay loam	silty clay, clay	3.6-5.5	<0.06-2.0	0.11-0.20	--
Hector	--	2-50	10-20	gravelly fine sandy loam	gravelly fine sandy loam	sandstone	4.5-6.5	2.0-6.0	0.08-0.15	--
39. Stigler-Counts										
Stigler	--	1-30	60+	silt loam	silty clay	silty clay	4.5-7.8	<0.06-2.0	0.13-0.22	--
Counts	--	0-5	60+	loam, silt loam	clay, silty clay loam	clay	4.5-8.4	<0.06-2.0	0.12-0.24	--
40. Liberal-Collinsville										
Liberal	--	2-30	20-50	silt loam, clay loam	silty clay loam	clay, shale	4.5-8.4	0.06-2.0	0.12-0.22	--
Collinsville	--	5-30	4-20	fine sandy loam, stony fine sandy loam	fine sandy loam, stony fine sandy loam	sandstone	5.1-6.5	2.0-6.0	0.09-0.16	--
41. Yanush-Bigfork										
Yanush	--	1-20	60+	cherty silt loam	cherty silty clay loam	cherty silty clay loam	4.5-6.5	0.6-2.0	0.08-0.17	--
Bigfork	--	15-30	20-40	stony silt loam	stony silty clay loam	chert bedrock	4.5-6.5	0.6-2.0	0.05-0.15	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
42. Tuskahoma-Wister-Sobol										
Tuskahoma	--	1-30	10-20	loam, silty clay loam	shaly clay	shale	5.1-7.8	<0.06-2.0	0.06-2.0	--
Wister	--	2-5	40-60	silt loam	silty clay, clay	soft shale	4.5-8.4	<0.06-2.0	0.14-0.24	--
Sobol	--	3-15	20-40	loam, silt loam	clay loam, clay	shale	4.5-8.4	0.06-2.0	0.12-0.20	--
43. Naldo-Linker-Sallisaw										
Naldo	--	0-5	60+	fine sandy loam	sandy clay loam	sandy clay loam	4.5-6.5	0.6-2.0	0.11-0.20	--
Linker	--	1-9	20-40	fine sandy loam	fine sandy loam, sandy clay loam	gravelly sandy clay loam, shale	3.6-5.5	0.6-2.0	0.11-0.20	--
Sallisaw	--	1-30	60+	loam	sandy clay loam	gravelly clay loam	5.1-6.5	0.6-2.0	0.10-0.18	--
44. Guyton-Rexor-Dela										
Guyton	--	0-5	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
Rexor	--	0-1	60+	loam, silt loam	clay loam	silt loam	4.5-6.0	0.6-2.0	0.15-0.24	yes
Dela	--	0-2	60+	sandy loam	fine sandy loam	fine sandy loam & loamy fine sand	5.1-6.5	2.0-6.0	0.07-0.15	yes
45. Carnasaw-Clebit-Bengal										
Carnasaw	--	9-50	42	loam	silty clay	sandstone, shale	4.5-6.0	0.06-2.0	0.08-0.20	--
Clebit	--	2-5	10-20	gravelly fine sandy loam	gravelly loam	sandstone	4.5-7.0	2.0-6.0	0.06-0.11	--
Bengal	--	--	--	--	--	--	--	--	--	--
ATOKA COUNTY										
46. Dennis-Eram										
Dennis	25	2-7	60+	silt loam, loam	silty clay loam, clay loam	clay, silty clay	4.5-8.4	0.06-2.0	0.15-0.20	--
Eram	36	1-5	20-40	clay loam	clay	shale	5.1-7.3	0.06-0.6	0.14-0.19	--
47. Enders-Hector										
Enders	65	2-45	40-60	gravelly very fine sandy loam	silty clay loam, silty clay	weathered shale	4.6-5.5	<0.06-2.0	0.08-0.20	--
Hector	17	2-50	10-20	gravelly fine sandy loam	gravelly fine sandy loam	sandstone	4.5-6.5	2.0-6.0	0.08-0.15	--

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
48. Kaufman-Gowton										
Kaufman	57	0-2	60+	clay	clay	clay	5.6-7.8	<0.06	0.15-0.20	yes
Gowton	33	0-1	60+	loam	clay loam	clay loam	5.6-8.4	0.6-2.0	0.11-0.20	yes
49. Bernow-Bosville										
Bernow	63	1-12	60+	fine sandy loam	loam, clay loam, sandy clay loam	clay loam, sandy clay loam	4.5-7.3	0.6-6.0	0.07-0.20	--
Bosville	13	0-8	60+	fine sandy loam	silty clay loam, clay	silty clay loam, clay	4.5-6.0	<0.06-0.6	0.11-.20	--
50. Guyton-Rexor-Boggy										
Guyton	21	0-1	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
Rexor	21	0-1	60+	loam, silt loam	clay loam	silt loam	4.5-6.0	0.6-2.0	0.15-0.24	yes
Boggy	21	--	--	--	--	--	--	--	--	yes
51. Chigley-Agan										
Chigley	50	1-12	60+	gravelly sandy loam	sandy clay, clay	gravelly clay	5.1-8.4	0.02-6.0	0.09-0.18	--
Agan	17	0-3	60+	loam, silt loam	clay, gravelly clay	gravelly clay	5.6-8.4	0.06-0.6	0.12-0.20	--
52. Burleson-Tarrant										
Burleson	35	0-5	60+	gravelly clay	clay, silty clay	clay, silty clay	5.6-8.4	<0.06	0.09-0.18	--
Tarrant	32	1-30	6-20	cobbly clay	cobbly clay	limestone	7.9-8.4	0.2-0.6	0.10-0.17	--
CHOCTAW COUNTY										
53. Bernow-Muskogee-Bosville										
Bernow	--	1-12	60+	fine sandy loam	loam, sandy clay loam	sandy clay loam	4.5-7.3	0.6-6.0	0.07-0.20	--
Muskogee	--	1-5	60+	silt loam	silt loam, silty clay loam	silty clay, clay	4.5-7.8	0.06-2.0	0.14-0.24	--
Bosville	--	0-8	60+	fine sandy loam	silty clay loam, clay	silty clay loam, clay	4.5-6.0	<0.06-0.6	0.11-0.20	--
54. Tenaha-Smithdale										
Tenaha	--	1-15	30-50	loamy fine sand	sandy clay loam	sandstone & shale	4.5-6.5	0.6-20.0	0.07-0.17	--
Smithdale	--	12-40	60+	sandy loam	sandy clay loam	sandy loam	4.5-5.5	0.6-6.0	0.05-0.16	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

	Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Perme-ability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
					Surface	Underlying Layer	Substratum				
55.	Hollywood-Swink										
	Hollywood	--	2-5	72+	clay loam	silty clay	silty clay, clay	6.1-8.4	<0.06-0.6	0.12-0.22	--
	Swink	--	2-15	10-20	clay, stony clay	clay, silty clay loam	limestone, shale	6.6-8.4	0.06-0.2	0.07-0.12	--
56.	Boggy-Guyton										
	Boggy	--	--	--	--	--	--	--	--	--	yes
	Guyton	--	0-1	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
57.	Pledger-Roebuck										
	Pledger	--	0-1	60+	clay	clay	clay	6.1-8.4	<0.06-0.2	0.12-0.22	yes
	Roebuck	--	0-2	60+	clay, silty clay	clay, silty clay	clay, silty clay	6.1-8.4	<0.06	0.12-0.20	yes
58.	Karma-Oklared-Severn										
	Karma	--	2-15	60+	fine sandy loam	clay loam, sandy clay loam	fine sandy loam	5.6-7.8	0.6-6.0	0.11-0.20	--
	Oklared	--	0-5	60+	fine sandy loam	fine sandy loam	very fine sandy loam	7.4-8.4	2.0-20.0	0.10-0.16	yes
	Severn	--	0-5	60+	very fine sandy loam	very fine sandy loam	very fine sandy loam	7.4-8.4	2.0-6.0	0.13-0.17	--
59.	Hopco-Trinity-Kaufman										
	Hopco	--	0-2	60+	silty clay loam	silty clay loam, clay loam	clay loam	6.6-8.4	0.2-0.6	0.15-0.22	yes
	Trinity	--	0-3	60+	clay	clay	clay	7.4-8.4	<0.06	0.15-0.20	yes
	Kaufman	--	0-2	60+	clay	clay	clay	5.6-7.8	<0.06	0.15-0.20	yes
60.	Clebit-Tuskahoma										
	Clebit	--	2-5	10-20	gravelly fine sandy loam	gravelly loam	sandstone	4.5-7.0	2.0-6.0	0.06-0.11	--
	Tuskahoma	--	1-15	10-20	loam, silty clay loam	shaly clay	shale	5.1-7.8	<0.06-2.0	0.06-0.16	--
61.	Hollywood-Ferris										
	Hollywood	--	2-5	72+	clay loam	silty clay	silty clay, clay	6.1-8.4	<0.06-0.6	0.12-0.22	--
	Ferris	--	5-15	60+	clay	clay	clay, silty clay	7.9-8.4	<0.06	0.15-0.18	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

	Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bed-rock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
					Surface	Underlying Layer	Substratum				
	PUSHMATAHA COUNTY										
62.	Ruston-Boggy-Saffell										
	Ruston	43	1-15	60+	fine sandy loam, gravelly fine sandy loam	sandy clay loam, fine sandy loam	fine sandy loam, sandy clay loam	4.5-6.5	0.6-2.0	0.09-0.17	--
	Boggy	14	--	--	--	--	--	--	--	--	yes
	Saffell	12	1-30	60+	gravelly fine sandy loam	gravelly sandy clay loam, gravelly fine sandy loam	gravelly fine sandy loam, gravelly sandy loam	4.5-5.5	0.6-6.0	0.04-0.15	--
63.	Bernow-Larue-Romia										
	Bernow	43	1-15	60+	fine sandy loam	loam, sandy clay loam	sandy clay loam	4.5-7.3	0.6-6.0	0.07-0.20	--
	Larue	14	2-9	60+	loamy fine sand	sandy clay loam	sandy clay loam	5.6-6.5	0.6-20.0	0.05-0.15	--
	Romia	9	3-20	40-60	loamy fine sand, cobbly loamy fine sand	sandy clay loam	sandstone	4.5-6.5	0.6-6.0	0.08-0.15	--
64.	Dela-Guyton-Pushmataha										
	Dela	31	0-5	60+	sandy loam	fine sandy loam	fine sandy loam & loamy fine sand	5.1-6.5	2.0-6.0	0.07-0.15	yes
	Guyton	22	0-1	60+	silt loam	silty clay loam	silty clay loam	4.5-6.0	0.06-2.0	0.15-0.23	yes
	Pushmataha	18	0-1	60+	loam, silt loam	loam, silt loam	loam/very fine sandy loam	5.1-7.3	0.6-2.0	0.13-0.20	yes
65.	Tuskahoma-Sherwood-Clebit										
	Tuskahoma	25	2-50	10-20	loam, silty clay loam	shaly clay	shale	5.1-7.8	<0.06-2.0	0.06-0.16	--
	Sherwood	17	2-10	50-60	fine sandy loam	gravelly clay loam, clay loam	sandstone & shale	4.5-6.0	0.6-6.0	0.08-0.20	--
	Clebit	14	2-5	10-20	gravelly fine sandy loam	gravelly loam	sandstone	4.5-7.0	2.0-6.0	0.06-0.11	--
66.	Carnasaw-Pirum-Clebit										
	Carnasaw	28	9-50	42	loam	silty clay	sandstone	4.5-6.0	0.06-2.0	0.08-0.20	--
	Pirum	22	5-30	22-50	fine sandy loam	sandy clay loam	sandstone	4.5-5.5	0.6-2.0	0.12-0.18	--
	Clebit	18	2-5	10-20	gravelly fine sandy loam	gravelly loam	sandstone	4.5-7.0	2.0-6.0	0.06-0.11	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Oklahoma

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Flood Hazard
				Surface	Underlying Layer	Substratum				
67. Honobia-Nashoba										
Honobia	35	9-20	20-40	stony fine sandy loam	clay loam, clay	shale	4.5-6.5	0.06-2.0	0.06-0.13	--
Nashoba	10	9-20	40-50	stony sandy loam	stony sandy loam	sandstone	5.1-6.0	2.0-6.0	0.05-0.14	--
68. Sobol-Tuskahoma-Wister										
Sobol	26	1-15	20-40	loam, silt loam	clay loam, clay	shale	4.5-8.4	0.06-2.0	0.12-0.20	--
Tuskahoma	15	2-5	10-20	loamy, silty clay loam	shaly clay	shale	5.1-7.8	<0.06-2.0	0.06-0.16	--
Wister	12	2-5	40-60	silt loam	silty clay, clay	soft shale	4.5-8.4	<0.06-2.0	0.14-0.24	--
69. Yanush-Bigfork										
Yanush	50	2-50	60+	cherty silt loam	cherty silty clay loam	cherty silty clay loam	4.5-6.5	0.6-2.0	0.08-0.17	--
Bigfork	45	20-50	20-40	stony loam, stony silt loam	stony silty clay loam, stony clay loam	chert bedrock	4.5-6.5	0.6-2.0	0.05-0.15	--

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Okalhoma

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Agan	moderate	high	severe-percs slowly, wet	slight	severe-too clayey	severe-too-clayey, wet	shrink-swell, low strength	poor-thin layer	poor-low strength, shrink-swell	unsuited
Alikchi	low	moderate	severe-percs slowly, floods	severe-depth to rock, floods	severe-wet floods	severe-wet, floods	piping, thinlayer	poor-wet	poor-wet	unsuited
Bates	moderate	moderate	severe-depth to rock	severe-depth to rock	moderate-depth	moderate-depth	thin layer	good	poor-thin layer	unsuited
Bengal	NO INTERPRETATIONS MADE									
Bernow	high	moderate	slight	moderate to severe-slope	slight	slight to moderate-slope	slight	fair-thin layer, slope	fair-low strength, shrink-swell	unsuited
Bigfork	moderate	moderate	severe-slope, depth, large stones	severe-slope, depth to rock	severe-depth, large stone	severe-depth large stones	large stones	poor-thin layer, large stones	poor-thin layer	unsuited
Boggy	NO INTERPRETATIONS MADE									
Bokoshe	low	low	severe-wetness	severe-wet, seepage, slope	moderate-wet	moderate-wet	piping, unstable fill	fair-thin layer, too clayey	fair-low strength	unsuited
Bonham	low	high	severe-percs slowly	slight to moderate-slope	severe-too clayey	severe-too clayey	compressible, shrink-swell	fair thin layer	poor-low strength, shrink-swell	unsuited
Bosville	low	high	severe-percs slowly, wet	severe-wetness	severe-wet, too clayey	severe-wet, too clayey	compressible, shrink-swell	poor-too clayey	poor-shrink-swell	unsuited
Burleson	low	high	severe-percs slowly	moderate-slope	severe-too clayey	severe-too clayey	hard to pack, shrink-swell	poor-too clayey	poor-shrink-swell	unsuited
Carnasaw	high	high	severe-percs slowly	moderate to severe-slope	severe-too clayey	severe-too clayey	thin layer, compressible	fair-thin layer, small stones	shrink-swell low strength poor	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	LIMITATION FOR USE AS: SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	SUITABILITY AS A SOURCE OF: TOPSOIL	ROADFILL	SAND/ GRAVEL
Chigley	moderate	moderate	severe-percs slowly, wet	severe-wetness, slope	severe-too clayey	severe-too clayey	hard to pack, shrink-swell	poor-thin layer, too clayey	poor-low strength	poor
Choteau	low	high	severe-percs slowly, wetness	slight	severe-wet, too clayey	severe-wet, too clayey	hard to pack, shrink-swell	good	fair-low strength, shrink-swell	unsuited
Clebit	low	low	severe-depth to rock	severe-depth to rock	severe-depth	severe-depth	thin layer, small stones	poor-thin layer, small stones	poor-thin layer, large stones	unsuited
Collinsville	high	low	severe-depth, large stones	severe-percs rapidly, depth to rock	severe-depth, percs rapidly	severe-depth to rock	severe-thin layer, large stones	poor-thin layer, large stones	poor-thin layer	unsuited
Counts	low	high	severe-wet, percs slowly	severe-wet	severe-wet, percs slowly	severe-too clayey, wet	unstable fill, compressible	fair-thin layer	poor-low strength, shrink-swell	unsuited
Crevasse	slight	low	severe-floods	severe-seepage, floods	severe-floods, seepage	severe-floods cutbanks cave	seepage, unstable fill	poor-too sandy	good	fair/ unsuited
Crockett	low	high	severe-wet, percs slowly	slight to moderate-slope	severe-wet, too clayey	severe-wet, too clayey	compressible, shrink-swell	poor-thin layer	poor-low strength, shrink-swell	unsuited
Dela	high	low	severe-wet, floods	severe-seepage, floods	severe-wet, floods, seepage	severe-floods	unstable fill, seepage	poor-too sandy	fair-low strength	unsuited
Dennis	moderate	high	severe-wet, percs slowly	moderate-slope	severe-too clayey	severe-wet too clayey	compressible, piping	fair-thin layer	poor-low strength, shrink-swell	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	LIMITATION FOR USE AS: SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	SUITABILITY AS A SOURCE OF: TOPSOIL	ROADFILL	SAND/ GRAVEL
Dougherty	moderate	low	slight	severe-seepage, slope	severe-seepage	moderate-cutbanks cave	erodes easily	poor-too sandy	good	fair/ unsuited
Enders	moderate	high	severe-percs slowly, large stones	severe-slope, large stones	moderate-too clayey	severe-too clayey, large stones	large stones, low strength, shrink-swell	poor-large stones	poor-large stones, shrink-swell	unsuited
Ennis	moderate	low	severe-floods, percs slowly	severe-floods, seepage	severe-floods	severe-floods	piping, compressible	good	fair-low strength	unsuited
Eram	moderate	high	severe-percs slowly, wet depth to rock	moderate-slope, depth to rock	severe-too clayey, depth	severe-too clayey, wetness	moderate-low strength, thin layer	fair-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Felker	high	moderate	severe-percs slowly, wetness	moderate-wetness, seepage	severe-wetness	severe-wetness	piping-compressible	good	fair-low strength	unsuited
Ferris	high	high	severe-percs slowly	severe-slope	severe-too clayey	severe-too clayey	unstable fill	poor-too clayey	poor-low strength, shrink-swell	unsuited
Gallion	moderate	moderate	moderate-percs slowly, wetness	slight	severe-wet seepage	severe-wet seepage	piping, erodes easily	good	fair-low strength	unsuited
Goldston	high	low	severe-depth, slope	severe-slope	severe-depth, slope	severe-depth, slope	small stones, thin layer,	poor-small stones, thin layer	poor-slope	poor
Gowton	moderate	low	severe-floods	moderate-seepage	severe-floods	severe-floods	piping, unstable fill	good	fair-low strength	unsuited
Guyton	moderate	low	severe-wetness, percs slowly	severe-wetness, floods	severe-wetness, floods	severe-wetness, cutbanks cave	erodes easily, low strength	poor-wetness	poor-wetness	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	LIMITATION FOR USE AS: SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	SUITABILITY AS A SOURCE OF: TOPSOIL	ROADFILL	SAND/ GRAVEL
Hartsells	moderate	low	severe-depth to rock	severe-depth to rock	severe-depth to rock	severe-depth to rock	low strength	fair-thin layer	good	fair-excess fines unsuited
Hector	moderate	low	severe-depth to rock, slope	severe-depth to rock seepage	depth to rock, seepage, severe	severe-depth to rock	thin layer	poor-thin layer, small stones	poor-thin layer	poor
Hollywood	high	high	severe-percs slowly	moderate-slope	severe-too clayey	severe-too clayey	compressible, low strength	poor-too clayey	poor-low strength, shrink-swell	unsuited
Homa	moderate	high	severe-percs slowly, wet	severe-slope	severe-wet too clayey	severe-wet too clayey	compressible, low strength	poor-thin layer	poor-low strength, shrink-swell	unsuited
Honobia	moderate	high	severe-percs slowly, depth to rock	severe-slope, large stones	depth to rock, moderate-slope	severe-too clayey, depth	thin layer, large stones	poor-large stones	poor-large stones, shrink-swell	unsuited
Hopco	moderate	moderate	severe-floods	severe-floods	severe-floods	severe-floods	compressible, low strength	fair-too clayey	fair-wetness, shrink-swell	unsuited
Karma	high	low	moderate-slope	severe-seepage	severe-seepage	moderate-slope	compressible, piping	fair-thin layer, slope	fair-low strength	unsuited
Kaufman	low	very high	severe-percs slowly, floods	severe-floods	severe-wet too clayey floods	too clayey, floods-severe wetness	low strength	poor-too clayey	poor-shrink-swell	unsuited
Kinta	moderate	high	severe-percs slowly, wetness	severe-wetness	severe-wet too clayey	severe-too clayey, wet	compressible, low strength	fair-thin layer	poor-low strength, shrink-swell	unuited
Kullit	moderate	moderate	severe-percs slowly, floods	severe-wetness	severe-wetness	moderate-wet too clayey	compressible, piping	fair-thin layer	poor-low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Lanton	moderate	high	severe-percs slowly, floods	severe-floods	severe-too clayey, floods	severe-floods too clayey	unstable fill, piping	good	poor-low strength, shrink-swell	unsuited
Larue	high	low	slight	moderate-seepage	moderate-seepage	slight	piping, unstable fill	poor, too sandy	good	poor/ unsuited
Liberal	moderate	high	severe-percs slowly, wetness	severe-wetness	severe-too clayey, wet	severe-wetness, too clayey	compressible, thin layer	fair-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Linker	moderate	moderate	severe-depth to rock	severe-depth to rock	severe-depth to rock	severe-depth to rock	thin layer, compressible	fair-thin layer	fair-low strength, thin layer	poor/ unsuited
Moreland	moderate	very high	severe-percs slowly, wetness	slight	severe-too clayey, wet	severe-wetness, too clayey	low strength, shrink-swell	poor-too clayey	poor-low strength shrink-swell	unsuited
Muskogee	high	high	severe-percs slowly	moderate-slope	severe-too clayey	severe-too clayey	low strength, compressible	fair-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Naldo	moderate	moderate	severe-wet	severe-wet-seepage, slope	slight	moderate-wet	piping, unstable fill	fair-thin layer, too clayey	fair-low strength	unsuited
Nashoba	low	low	severe-depth to rock	severe-depth to rock seepage	severe-seepage depth	severe-depth to rock	thin layer, large stones	poor-thin layer	severe-thin layer	poor
Neff	moderate	moderate	severe-floods, percs slowly	severe-floods, wet	severe-floods, wet	severe-floods wet	unstable fill, piping	fair-thin layer	fair-low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Norwood	moderate	low	moderate-floods	moderate-seepage, slope	moderate-floods	moderate-floods	erodes easily	good/fair	severe-low strength	unsuited
Ochlockonee	high	low	severe-floods	severe-floods, seepage	severe-wetness, seepage, floods	severe-floods	seepage, piping, erodes easily	good	good	poor/ unsuited
Octavia	high	moderate	severe-slope, large stones	severe-slope, large stones	severe-slope large stones	severe-slope large stones	large stones, small stones	poor-large stones	poor-large stones	unsuited
Oklared	moderate	low	severe-wet, floods	severe-wet, seepage, floods	severe-floods seepage	severe-floods	unstable fill, piping	good	fair-low strength	unsuited
Parson's	moderate	high	severe-percs slowly, wet	moderate-slope	severe-too clayey	severe-wet, too clayey	unstable fill, compressible	fair-thin layer	poor-low strength, shrink-swell	unsuited
Pickens	high	low	severe-depth to rock	severe-depth, slope	severe-depth	severe-depth	thin layer, compressible	poor-thin layer, small stones	poor-low strength, thin layer	unsuited
Pirum	high	moderate	severe-depth to rock	severe-depth to rock	severe-depth to rock	severe-depth to rock	thin layer, low strength, compressible	fair-slope thin layer	low strength, slope, thin layer, fair	unsuited
Pledger	low	high	severe-percs slowly, wetness	severe-floods, wetness	severe-too clayey, wetness	severe-wetness too clayey, floods	low strength	poor-too clayey	poor-low strength, shrink-swell	unsuited
Pushmataha	moderate	low	severe-wet, floods	severe-wet, floods	severe-wet floods	severe-wet floods	wetness	poor-wetness	poor-wetness	unsuited
Redlake	moderate	high	severe-percs slowly, floods	severe-floods	severe-floods, too clayey	severe-floods too clayey	unstable fill, compressible	poor-too clayey	poor-low strength, shrink-swell	unsuited

Oklahoma

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Redport	moderate	moderate	severe-floods	severe-floods	severe-floods	severe-floods	piping, compressible, unstable fill	fair to good	fair-low strength, shrink-swell	unsuited
Rexor	moderate	moderate	severe-floods	severe-floods	severe-floods, wetness	severe-floods	unstable fill, seepage	fair-thin layer	fair-low strength	unsuited
Robinsonville	moderate	low	severe-floods	severe-floods, seepage	severe-floods seepage	severe-floods cutbanks cave	piping, seepage	good	good	poor
Rock Outcrop	NO INTERPRETATIONS MADE									
Roebuck	moderate	high	severe-percs slowly, floods	severe-floods	severe-floods, too clayey	severe-floods too clayey	compressible, unstable fill	poor-too clayey	poor-low strength, shrink-swell	unsuited
Romia	high	low	moderate-percs slowly, depth to rock, slope	severe-seepage, slope	moderate-depth to rock, slope	moderate-slope	thin layer	poor-too sandy	fair-low strength, thin layer	poor
Rosebloom	high	low	severe-floods, percs slowly	severe-floods	severe-floods	severe-floods	hard to pack, piping	fair-wet	poor-low strength	unsuited
Ruston	high	low	slight	moderate-seepage, slope	slight	slight	slight	fair-thin layer, too sandy	fair-low strength	unsuited
Sacue	high	high	severe-percs slowly	severe-slope	moderate-too clayey	moderate-too clayey	compressible, piping	fair-thin layer	poor-low strength, shrink-swell	unsuited
Saffell	high	low	moderate-slope	severe-slope, percs radidly	moderate-slope	severe-small stones	piping, seepage, thin layer	poor-small stones	good	poor/fair
Salisaw	moderate	moderate	moderate to severe-slope	moderate to severe-slope, seepage	moderate-stope	moderate to severe-slope	thin layer, low strength	fair-thin layer, slope	fair-slope, low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Severn	moderate	low	slight	severe-seepage	severe-seepage		piping, erodes easily	good	fair-low strength	poor
Sherwood	moderate	moderate	moderate-percs slowly, depth	moderate-seepage, depth	severe-depth	moderate-depth	thin layer, unstable fill	fair-thin layer	fair-thin layer	unsuited
Smithdale	high	low	moderate to severe-slope	severe-seepage, slope	moderate to severe-slope	moderate to severe-slope	piping, unstable fill	fair to poor-slope	good to fair-slope	unsuited
Sobol	moderate	high	severe-depth, percs slowly, wetness	severe-depth, wetness	severe depth, wet too clayey	severe-wet, too clayey	thin layer, hard to pack	poor-thin layer	poor-thin layer, shrink-swell	unsuited
Steedman	high	high	severe-depth, wetness, percs slowly	severe-depth, wetness	severe depth, wet too clayey	severe-depth too clayey	compressible, shrink-swell	poor-thin layer, too clayey	poor-low strength, shrink-swell	unsuited
Stidham	moderate	low	slight	severe-seepage	severe-seepage	severe-cutbanks cave	hard to pack, seepage	poor-too sandy	good	fair/ unsuited
Stigler	high	high	severe-percs slowly, wet	slight to moderate-slope	severe-too clayey	severe-wet, too clayey	compressible, low strength	good	poor-low strength, shrink-swell	unsuited
Swink	moderate	high	severe-percs slowly, depth	severe-depth, slope	severe-depth, too clayey	severe-depth too clayey	thin layer	poor-too clayey	poor-low strength, shrink-swell	unsuited
Talihina	moderate	high	severe-percs slowly, depth	severe-depth, slope	severe-too clayey	severe-wetness too clayey	thin layer	fair to poor-too clayey, thin layer	poor-low strength, shrink-swell	unsuited
Talpa	high	moderate	severe,depth, slope	severe-slope, depth	severe-depth	severe-depth	thin layer, piping	poor-thin layer, too clayey	poor-low strength, thin layer	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Tamaha	moderate	high	severe-percs slowly, wetness	severe-wetness	severe-too clayey	severe- wetness, too clayey	compressible, low strength	fair-thin layer	poor-shrink-swell, low strength	unsuited
Tarrant	low	low	severe-depth to rock	severe-depth to rock	severe-depth to rock	severe depth to rock	thin layer, large stones	poor-thin layer, large stones	poor-thin layer, large stones	unsuited
Tenaha	high	low	moderate-depth to rock	severe-slope, seepage	moderate-depth	slope-slight to moderate	piping	poor-low sandy	good	poor/ unsuited
Tiak	high	high	severe-percs slowly	severe-slope	severe-too clayey	severe-too clayey	compressible, shrink-swell	fair-thin layer	poor-low strength, shrink-swell	unsuited
Trinity	low	very high	severe-floods, percs slowly, wetness	severe-wetness, floods	severe-floods, too clayey	severe-wet, floods, too clayey	compressible, unstable fill	poor-too clayey	poor-low strength, shrink-swell	unsuited
Tuskahoma	moderate	high	severe-depth percs slowly	severe-wetness, depth to rock	severe-too clayey,	severe-wetness, too clayey	thin layer	poor-thin layer	poor-low strength, shrink-swell	unsuited
Vanoss	low	moderate	moderate-percs slowly	moderate-seepage	slight	slight	--	good	fair-too clayey,	unsuited
Verdigris	high	moderate	severe-percs slowly, floods	severe-seepage, floods	severe-floods	severe-floods	hard to pack, piping	good	poor, low strength, hard to pack	unsuited
Vian	high	moderate	severe-percs slowly, wet	moderate-slope	moderate-too clayey wet	moderate-wet	piping, unstable fill	good	poor-low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

Oklahoma

SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	LIMITATION FOR USE AS: SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	SANITARY LANDFILLS*	SHALLOW EXCAVATIONS	EMBANKMENTS	SUITABILITY AS A SOURCE OF: TOPSOIL	ROADFILL	SAND/ GRAVEL
Wilson	moderate	high	severe-percs slowly, wet	slight	severe-wet too clayey	severe-wet, too clayey	compressible, low strength	poor-thin layer	poor-low strength, shrink-swell	unsuited
Wister	moderate	moderate	severe-percs slowly	moderate-depth to rock	severe-too clayey	severe-wet too clayey	thin layer, unstable fill	fair-thin layer	poor-low strength, shrink-swell	unsuited
Wrightsville	moderate	high	severe-wet, percs slowly	slight	severe-wet too clayey	severe-wet too clayey	compressible, low strength	poor-wet	poor-low strength, shrink-swell	unsuited
Yahola	high	low	slight	severe-seepage	severe-seepage, wetness	severe-cut-banks cave	hard to pack	good	fair-low strength	poor/ unsuited
Yanush	high	moderate	moderate-slope	severe-small stones	severe-small stones	severe-small stones	seepage	poor-small stones	fair-shrink-swell	unsuited/ poor

* Trench-type sanitary landfills

Partial List of Soil Series with Map Units Having Potential for Severe Erosion Hazard

- Agan
- Bates
- Bernow
- Bigfork
- Carnasaw
- Chigley
- Collinsville
- Dougherty
- Eram
- Ferris
- Hartsells
- Hector
- Homa
- Honobia
- Karma
- Linker
- Muskogee
- Naldo
- Parsons
- Pirum
- Romia
- Ruston
- Saffell
- Sherwood
- Sobol
- Stidham
- Stigler
- Talihina
- Tamaha
- Tiak
- Tuskahoma
- Vian
- Yanush

Soil Series with Map Units Having High Watertables,[1] Southeast Oklahoma URA

SERIES	DEPTH (FT)	KIND OF WATER TABLE	MONTHS
Agan	0-2.0	Perched	Dec.-May
Alikchi	0-1.0	Perched	Nov.-April
Bokoshe	1.5-3.0	Apparent	
Bosville	1.0-2.0	Perched	Feb.-July
Chigley	3.0-4.0	Perched	Feb.-May
Counts	1.0-2.0	Perched	Nov.-April
Coushatta	4.0-6.0	Apparent	Dec.-April
Crockett	1.0-2.0	Apparent	
Dela	3.0-5.0	Apparent	Nov.-May
Dennis	.20-3.0	Perched	Dec.-April
Eram	.20-3.0	Perched	Dec.-April
Felker	2.0-3.0	Apparent	
Garton	2.0-3.0	Perched	Nov.-April
Guyton	0-1.5	Apparent	Dec. May
Hopco	0.5-1.0	Apparent	Dec.-May
Kaufman	0-3.5	Apparent	Nov.-April
Kinta	1.0-2.0	Apparent	
Kullit	2.0-3.0	Apparent	Dec.-May
Latanier	1.0-3.0	Apparent	Dec.-April
Liberal	1.0-2.0	Perched	Nov.-March
Lightning	0-2.0	Perched	Nov.-April
Moreland	0-1.5	Perched	Dec.-April
Naldo	3.0-6.0	Perched	Nov.-April
Neff	0.5-2.5	Apparent	Nov.-May
Ochlockonee	3.0-4.0	Apparent	Dec.-April
Oklared	3.0-4.0	Apparent	Mar.-May
Parsons	0.5-1.5	Perched	Dec.-April
Pledger	0-2.5	Apparent	Dec.-Feb.
Pushmataha	0-3.0	Apparent	Nov.-April
Rexor	3.0-4.0	Apparent	Nov.-May
Sobol	0.5-1.5	Perched	Nov.-April
Stigler	2.0-3.0	Perched	Nov.-June
Talihina	0.5-2.0	Perched	Nov.-April
Tamaha	1.0-2.0	Perched	Nov.-April
Trinity	0-3.0	Apparent	Nov.-Feb.
Tuskahoma	0.5-1.5	Perched	Nov.-April
Tuscumbia	0.5-1.5	Apparent	Dec.-April
Vian	2.0-3.0	Perched	Mar.-May
Wister	2.0-3.0	Perched	Nov.-May
Wrightsville	0.6-1.5	Perched	Dec.-April

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[1] List may not reflect all soils having a high watertable due to limited availability of soils information at the present time.

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General Soils Map (with legend), Choctaw County. Soil Conservation Service, 1977.

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Soil Survey of McCurtain County, Oklahoma. Soil Conservation Service, November 1974.

Soil Survey of Pittsburg County, Oklahoma. Soil Conservation Service, May 1971.

General Soils Map (with legend), Pushmataha County. Soil Conservation Service, 1974.

Information on soil series was also obtained from SCS SOILS-5 forms issued for each series, and published by the Soil Conservation Service.

UNITED STATES GOVERNMENT

memorandum

DATE: November 16, 1977

REPLY TO ATTN OF: Tom Bargsten, Albuquerque District Office

SUBJECT: Soil Series Having Mapping Units Subject to Flooding

TO: Glenn Carpenter
Oklahoma Project Office

I went through the Soils 5's and the survey reports to obtain the list of soils that are potentially affected by flooding at certain times of the year. Emphasis is on the word "potential" -- not all these soils will be flooded each year, and if protected by diversion structures, etc., they may never experience flooding. Soils maps will indicate where these soils are located in the counties. Please call me if you have questions about the list.

SOIL SERIES HAVING MAPPING UNITS WITH POTENTIAL FLOOD HAZARDS:

Adaton (occasional)
Bibb (frequent)
Coushatta (common)
Garton (rare)
Guyton (common)
Idabel (occasional)
Kiomatia (frequent)
Lela (occasional)
Moreland (common)
Norwood (common)
Oklared (occasional)
Portland (common)
Redlake (occasional)
Rexor (common)
Toine (common)
Tuscumbia (common)
Iuka (frequent)
Crevasse (occasional)
Carytown (occasional)
Ennis (occasional)
Robinsonville (frequent)
Rosebloom (occasional)
Yahola (rare)

Alikchi (occasional)
Ceda (frequent)
Dela (common)
Gowton (common)
Hopco (common)
Kaufman (common)
Latanier (common)
Lightening (occasional)
Morganfield (common)
Ochlockonee (common)
Pledger (common)
Pushmataha (common)
Redport (occasional)
Roebuck (common)
Trinity (frequent)
Boggy (common)
Frizzell (occasional)
Mhoon (common)
Neff (frequent)
Lanton (frequent)
Chastain (occasional)
Verdigris (occasional)

The frequency of flooding is included (in parentheses) and corresponds to the following definitions:

Rare - flooding unlikely,but possible under abnormal conditions
Common - flooding likely under normal conditions
Occasional - less often than once in 2 years
Frequent - more often than once in 2 years

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

SABINOSA AREA

RIO GRANDE

SOIL ASSOCIATIONS:
MAPS TABLES DESCRIPTIONS

SOILS OF THE SABINOSA AREA

SAN MIGUEL COUNTY

TAOS RESOURCE AREA

A soil map unit represents an area on the landscape that consists primarily of the soils for which the unit is named. Soils that have similar "profiles" (sequence of horizons or layers) make up a soil series. All the soils included in a series have major horizons that are similar in composition, thickness, and arrangement in the profile; they have essentially the same properties that affect their use and management.

Some map units are made up of two or more major soils that are so intricately mixed they cannot be separated on the soil map. This is termed a soil complex. Soils that are geographically associated in a re-occurring geographic pattern are described as a soil association. These soils can be separated and mapped as individual entities if management conditions require such separation.

Most soil map units include small, scattered areas of soils that differ from those appearing in the map unit name. These "inclusions" may have substantially different characteristics than those of the dominant soil or soils, and may significantly affect use and management of an area. This is particularly true for site-specific use such as construction activity. An on-site soil investigation is essential for specific use applications.

Miscellaneous land types are map units reflecting areas having little or no soil cover and that support little or no vegetation. "Rock outcrop" and "Badland" are examples.

Chemical and physical characteristics of the soils are given in Table I, and should be used in conjunction with "Interpretations for Selected Uses" (Table II). These tables-along with the brief narrative descriptions-give a picture of the soil that will provide a basis for land management decisions affecting the soils resource.

Sabinosa Area:

Soil Map Units

AY	Apache-Ayon Complex, rolling
BA	Badland
CA	Canez - Ima association, undulating
CD	Carnero - Partri association, undulating
CK	Conchas - Latom association, undulating
CT	Crews - Tricon association, undulating
GC	Gullied land - Montoya complex, gently sloping
LB	Lacita - San Jose association, gently sloping
LC	La Lande - Redona association, undulating
LN	Latom - Newkirk - Rock outcrop association, rolling
MF	Montoya - Tucumcari association, gently sloping
NW	Newkirk - Walkon - Conchas association, undulating
RT	Rock outcrop - Torriorthents complex, very steep
TR	Tuloso - Rock outcrop - Sombordoro association, steep
TS	Tuloso - Sombordoro - Rock outcrop complex, moderately sloping
UR	Ustorthents - Rock outcrop complex, very steep

Apache-Ayon Complex (AY)

The soils of this map unit occur on basalt-capped mesas and on basalt flows. Slopes range from 1 to 15 percent. About 40 percent of this unit is Apache cobbly loam, 1 to 5 percent slopes; Ayon stony loam (5 to 15 percent slopes) makes up about 35 percent of the unit. Apache soils are less than 20 inches deep over basalt bedrock. Surface texture typically is cobbly loam; this grades into cobbly clay loam that overlies bedrock. Ayon soils are deep and have a stony loam surface texture. This overlies stony clay loam that grades into very stony loam.

These soils are moderately permeable, with low to moderate available water holding capacity. Water erosion hazard is slight to moderate.

Dominant vegetation includes sideoats grama, little bluestem, western wheatgrass, blue grama, and Indian ricegrass. Range site designation is Malpais Cp-1, with normal vegetation production ranging from 800 to 1,000 pounds, air dry weight.

Badland (BA)

This land type consists of eroded sandstone and shale upland slopes of 1 to 65 percent. The erosion hazard is moderate to severe. Soil material is highly variable in texture and depth.

Canez-Ima association (CA)

These soils occur on upland fans, terraces, and valley-filling sideslopes of 1 to 5 percent. Canez soils make up about 70 percent of the map unit; Ima soils make up approximately 20 percent.

These soils are deep and well-drained. Surface textures range from fine sandy loam to loamy sand. This overlies sandy clay loam (Canez) and clay loam (Ima). Permeability is moderate to moderately rapid, and water holding capacity is high. The erosion hazard is moderate.

Blue grama, little bluestem, black grama, and sand dropseed are the predominant plants in the potential vegetation. Sandy Loam and Sandy Plains, CP-2, are the respective range sites, with an average annual air dry production of about 900 pounds.

Carnero - Partri association (CD)

This unit is developing on upland mesas, benches, and side-slopes in sandstone alluvium. Slopes range from 0 to 5 percent. Each of the soils makes up about 40 percent of the map unit.

Carnero soils are moderately deep and have a loam surface texture, silty clay or clay subsoil, and a clay substratum overlying sandstone. Permeability is slow, and the available water capacity is low. Partri soils are deep, with a silt loam surface overlying clay loam or gravelly clay loam. Permeability is slow and the available water capacity is high. Erosion hazard for this soil map unit is moderate.

Blue grama, western wheatgrass, and sideoats grama are the dominant potential vegetation. Range site is Loamy Cp-1, with potential production of about 900 to 950 pounds per acre.

Conchas-Latom association (CK)

Conchas and Latom soils are developing on upland mesas, benches and sideslopes in sandstone and shale alluvium or residuum. Slopes range from 1 to 7 percent. This unit is about 45 percent Conchas soils and 40 percent Latom soils. Rock outcrop occurs on low ridges.

Conchas soils are moderately deep over sandstone and shale bedrock. Surface texture is loam, grading into loam or clay loam subsoil material. Permeability is moderately slow, available water capacity is moderate, as is the erosion hazard. Latom soils are very shallow to shallow over sandstone bedrock. Texture is fine sandy loam, overlying sandstone bedrock at about 10 inches. Permeability of the soil is moderate and available water capacity is very low. Water erosion hazard is moderate, and wind erosion hazard is high.

The potential plant community includes blue grama, black grama, sideoats grama, and galleta. Average annual production is about 750 pounds. Range sites are Loamy Cp-2 (Conchas) and Shallow Sandstone Cp-2 (Latom).

Crews - Tricon association (CT)

This map unit occurs on upland mesas, benches, and sideslopes with slopes of 0 to 5 percent. The soils are developing in sandstone and shale alluvium and in aeolian material. Crews soils make up 45 percent of the unit, and Tricon soils are about 40 percent.

Crews soils are shallow to indurated caliche; Tricon soils are moderately deep, with indurated caliche at an average depth of 33 inches. Surface texture is usually silt loam, and grades into clay loam or clay above the caliche. Permeability is moderately slow to slow, available water capacity is very low (Crews) to moderate (Tricon); erosion hazard is moderate.

Range sites are Shallow Cp-1 (Crews) and Loamy Cp-1 (Tricon), with average annual vegetative production of 650 pounds and 900 pounds respectively. Potential vegetation includes sideoats grama, blue grama, western wheatgrass, and little bluestem.

Gullied land - Montoya Complex (GC)

This map unit occurs on floodplains having slopes of 1 to 3 percent. Gullied land (actively eroding gullies) makes up about 50 percent of the unit; Montoya soils are about 20 percent. Erosional remnants of La Lande, Lacita, and Tucumcari soils make up about 30 percent of the unit. Bedrock of sandstone and shale is exposed in the gully bottoms.

The Montoya soils are deep, having a clay loam surface and clay subsoil and substratum. Permeability is very slow, the available water capacity is high, and wind and water erosion hazard is high.

The Montoya soils occur in a Bottomland Cp-2 range site. Potential vegetation includes alkali sacaton, tobosa, blue grama, and vine mesquite, with an average production of 1,200 pounds per acre where the soil is not actively eroding.

Lacita - San Jose association (LB)

These soils are developing on floodplains having slopes of 0 to 3 percent. Parent material is mixed mineralogy alluvium. The unit is 45 percent Lacita, 30 percent San Jose soils, and 15 percent Ustifluvents. Lacita soils occur on the slightly higher terraces on the floodplain; Ustifluvents occupy the intermittant stream beds. Soils are deep.

Lacita soils have silty clay loam texture throughout the soil profile. Available water capacity is high, and the permeability is moderately slow. The San Jose soils have fine sandy loam texture throughout. Permeability is moderately rapid, and available water capacity is high. Ustifluvents are stratified sand, sandy loam, and silt loam. Permeability is rapid, and available water capacity is moderate.

These soils have moderate water erosion hazard, are very susceptible to wind erosion, and are subject to brief periods of flooding in July through September.

The range site for this unit is Bottomland Cp-2. Dominant potential vegetation includes giant sacaton, alkali sacaton, vine-mesquite, sideoats grama, and blue grama. Total production is normally 2,100 to 2,300 air dry pounds per acre.

La Lande - Redona association (LC)

This map unit occurs on alluvial fans having slopes of 3 to 7 percent. About 65 percent of the unit is La Lande soils; Redona soils make up 20 percent. Soils are deep and well-drained, with moderate erosion hazard.

Surface textures range from sandy loam (La Lande) to loam (Redona). The underlying material is loam or sandy clay loam in the La Lande soils, and clay loam in Redona soils. Permeability of these soils is moderate; they have high available water capacity.

Potential vegetation includes blue grama, little bluestem, black grama, galleta, and yucca. Range sites are Sandy Loam Cp-2 (La Lande) and Loamy Cp-2 (Redona); average annual production is 850 pounds per acre.

Latom - Newkirk-Rock outcrop (LN)

The soils of this map unit occur on upland ridges and hills; they are developing in sandstone parent material.

These soils are shallow to very shallow over sandstone bedrock. Surface textures are fine sandy loam to sandy loam. Newkirk soils have a sandy clay loam subsoil. Permeability of these soils is moderate, and available water capacity is very low. Water erosion hazard is moderate, and wind erosion hazard is high. The Rock outcrop is sandstone which occurs as escarpments, ridges, and eroded exposures.

The potential vegetation on this Shallow Sandstone Cp-2 range site includes the sideoats, blue and black grama grasses, and little bluestem. The average production ranges from 700 to 750 pounds per year.

Montoya - Tucumcari association (MF)

This unit occurs on floodplains and alluvial fans, on slopes of 0 to 3 percent. Montoya soils make up about 45 percent of the unit, 30 percent is Tucumcari, and 15 percent is Lacita soils. The wind erosion hazard for these soils is high; their water erosion hazard is slight.

Surface textures range from loam (Tucumcari) to clay loam or silty clay loam (Montoya, Lacita). Subsurface material ranges in texture from silty clay loam to clay. These deep soils have moderately slow to very slow permeability, with high available water capacity.

Potential vegetation--and annual production--includes:

Montoya	Bottomland Cp-2	1,200 pounds per acre	Alkali sacaton Tobosa Blue grama Vine mesquite
Tucumcari	Clayey Cp-2	850 pounds acre	Blue grama Alkali sacaton Galleta
Lacita	Bottomland Cp-2	2,100 pounds per acre	Giant sacaton Sideoats grama Alkali sacaton Blue grama

Newkirk - Walkon - Conchas association (NW)

These soils are developing on upland ridges and alluvial fans, in material derived from sandstone and shale. Newkirk soils make up about 45 percent of the unit, Walkon, about 25 percent, and 20 percent is Conchas soils. Soils are shallow (Newkirk) to moderately deep over sandstone and shale. Slopes range to 7 percent.

Surface textures range from fine sandy loam to loam. Subsoil material is clay loam grading into silt loam, with sandstone and shale at 31 inches (Walkon), and clay loam overlying bedrock at 30 inches (Conchas). Permeability is moderate to moderately slow. Water erosion hazard is moderate. Available water capacity is low to moderate.

Range sites, potential vegetation and production:

			Annual air-dry Production Pounds/acre
Newkirk	Shallow Sandstone Cp-2	Blue grama New Mexico featheгgrass Black grama Little bluestem	700 pounds
Walkon	Loamy Cp-2	Blue grama Black grama Galleta Sand dropseed	650 pounds
Conchas	Loamy Cp-2	Blue grama Black grama Galleta Sideoats grama	750 pounds

Rock Outcrop - Torriorthents Complex (RT)

This map unit occurs on escarpments having slopes up to 100 percent. The unit is 70 percent rock outcrop and about 20 percent Torriorthents. Parent material is sandstone and shale. The Torriorthents are very stony soils, highly variable in texture, depth, and permeability. Water erosion hazard ranges from slight to high depending on specific site location. These areas should be avoided for any development. Areas with soil cover produce little bluestem, sideoats grama, blue grama, and galleta.

Tuloso - Rock Outcrop - Sombordoro association (TR)

This map unit is on ridges and canyon sides on slopes up to 35 percent. Parent material is sandstone. Tuloso soils make up about 35

percent of the unit, Rock outcrop about 35 percent, and 20 percent is Sombordoro soils. The soils are shallow to very shallow over sandstone.

Tuloso soils have a stony sandy loam surface texture, very stony loam subsoil, and overlie sandstone at 11 inches. Permeability is moderate and available water capacity is very low. Surface layer of the Sombordoro soils is a very stony fine sandy loam; subsoil is very stony clay, with sandstone at 16 inches. Permeability is slow and available water capacity is very low. Water erosion hazard for this map unit is moderate.

			Annual air-dry Production Pounds/Acre
Tuloso	Breaks Cp-1	Pinyon Juniper Hairy grama Sideoats grama	600
Sombordoro	Shallow Cp-1	Pinyon Juniper Blue grama Pinyon ricegrass	450

Tuloso - Sombordoro - Rock outcrop complex (TS)

This unit occurs on ridges and along escarpments having slopes to 15 percent. Tuloso stony sandy loam makes up about 40 percent of the unit, 30 percent is Sombordoro very stony loam, and about 25 percent is Rock outcrop. Soil characteristics and vegetation are similar to those described for the Tuloso - Rock outcrop - Sombordoro association (TR).

Ustorthents - Rock outcrop complex (UR)

This map unit is on breaks and benches on mesas and plateaus. Slopes range from 15 to 100 percent. Ustorthents make up about 40 percent of the area; 40 percent is Rock outcrop. The Ustorthents are highly variable in soil profile, texture, and characteristics. The potential plant community includes sideoats grama, pinyon, juniper, and oak species.

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

San Miguel County: Sabinosa Area			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	**EROSION HAZARD**	**SHRINK SWELL**	**SEPTIC TANK FILTER FIELDS**	**POND RESERVOIR AREAS**	**SANITARY LANDFILLS[1]**	**SHALLOW EXCAVATIONS**	**PATHS & TRAILS**	**TOPSOIL**	**ROADFILL**	**SAND/ GRAVEL**
Apache	slight	low	severe: depth to rock	depth to rock	moderate: stone, cobble	severe: depth to rock	moderate: small stones	poor: thin layer, small stones	poor: thin layer	unsuited
Ayon	moderate	low	severe: large stones	seepage	moderate: stones	severe: large stones	moderate: large stones	severe: large stones	poor: large stones	unsuited
Badland	high		NO INTERPRETATIONS MADE							
Canez	moderate	low	moderate: percs slowly	seepage, slope	slight	slight	slight	good	fair: low strength	unsuited
Carnero	moderate	high	severe: depth to rock, percs slowly	depth to rocks, slope	moderate: too clayey	severe: depth to rock	slight	fair: thin layer, too clayey	poor: shrink-swell, low strength	unsuited
Conchas	moderate	moderate	severe: depth to rock, percs slowly	depth to rock	slight	severe: depth to rock	moderate: dusty	fair: thin layer, too clayey	poor: thin layer, low strength	unsuited
Crews	moderate	high	severe: cemented pan	cemented pan	slight	severe: cemented pan	slight	poor: thin layer, too clayey	poor: shrink-swell, low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

San Miguel County: Sabinosa Area	LIMITATION FOR USE AS:							SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	POND RESERVOIR AREAS	SANITARY 1/ LANDFILLS	SHALLOW EXCAVATIONS	PATHS & TRAILS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Gullied land	high		NO INTERPRETATIONS MADE							
Ima	moderate	low	slight	seepage	slight	slight	moderate: too sandy	fair: too sandy	good	poor/ unsuited
Lacita	moderate*	moderate	severe: percs slowly, floods	favorable	severe: floods	moderate: floods	moderate: floods	fair: too clayey	fair: low strength, shrink-swell	unsuited
La Lande	moderate	moderate	moderate: percs slowly	seepage, slope	slight	slight	slight	fair: too clayey	fair: low strength, shrink-swell	unsuited
Latom	moderate	low	severe: depth to rock	depth to rock	moderate: slope	severe: depth to rock	slight	poor: thin layer	poor: thin layer	unsuited
Montoya	slight	high	severe: percs slowly	favorable	moderate: floods, too clayey	moderate: floods, too clayey	slight	poor: too clayey	poor: low strength, shrink-swell	unsuited
Newkirk	moderate	moderate	severe: depth to rocks	depth to rock, slope	slight	severe: depth to rock	slight	poor: thin layer	poor: thin layer	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

San Miguel County: Sabinosa Area			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	POND RESERVOIR AREAS	SANITARY 1/ LANDFILLS	SHALLOW EXCAVATIONS	PATHS & TRAILS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Partri	moderate	high	severe: percs slowly	slope	slight	moderate: too clayey	fair: too clayey	fair: too clayey	poor: shrink-swell, low strength	unsuited
Redona	moderate	moderate	moderate: percs slowly	slope	slight	slight	moderate: dusty	fair: too clayey	fair: low strength, shrink-well	unsuited
Rock outcrop	slight		NO INTERPRETATIONS MADE							
San Jose	moderate	low	severe: floods	seepage	severe: floods	moderate: floods	moderate: floods	good	fair: low strength	poor/ unsuited
Sombordoro	moderate	high	severe: depth to rock, large stones	depth to rocks	moderate: stones	severe: depth to rock	severe: large stones	poor: too clayey, thin layer	poor: low strength, shrink-swell	unsuited
Torriorthents	moderate		NO INTERPRETATIONS MADE							
Tricon	moderate	high	severe: cemented pan, percs slowly	cemented pan	slight	severe: cemented pan	slight	fair: thin layer, too clayey	poor: low strength, shrink-swell	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

San Miguel County: Sabinosa Area			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	**EROSION HAZARD**	**SHRINK SWELL**	**SEPTIC TANK FILTER FIELDS**	**POND RESERVOIR AREAS**	**SANITARY 1/ LANDFILLS**	**SHALLOW EXCAVATIONS**	**PATHS & TRAILS**	**TOPSOIL**	**ROADFILL**	**SAND/ GRAVEL**
Tucumcari	moderate	high	severe: percs slowly	favorable	slight	moderate: too clayey	slight	poor: too clayey	poor: thin layer	poor/ unsuited
Tuloso	moderate	low	severe: depth to rock	seepage, depth to rock	severe: seepage	severe: depth to rock	severe: large stones, slope	poor: thin layer, large stones	poor: thin layer	poor/ unsuited
Ustorthents	moderate		NO INTERPRETATIONS MADE							
Walkon	moderate	high	severe: depth to rock, percs slowly	slope, depth to rock	slight	severe: depth to rock	slight	fair: thin layer, too clayey	poor: low strength, thin layer	unsuited

1/ Rating for area landfills

* subject to brief periods of flooding

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

1 of 3

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
Apache-Ayon		1-15								
Apache	40		19	cobbly clay loam	cobbly clay loam	bedrock	7.4 - 8.4	0.6 - 2.0	0.12 - 0.16	0 - 2
Ayon	35		60+	stony loam	very stony loam	very stony loam	7.4 - 8.4	0.6 - 2.0	0.12 - 0.16	0 - 2
Badland	--	1-65	--	--	--	--	--	--	--	--
Canez-Ima		1-5								
Canez	70		60+	fine sandy loam	sandy loam	sandy clay loam	7.4 - 8.4	0.6 - 6.0	0.12 - 0.16	0 - 2
Ima	20		60+	loamy fine sand	loam	clay loam	7.4 - 8.4	0.6 - 6.0	0.11 - 0.20	0 - 2
Carnero-Partri		0-5								
Carnero	40		27	loam	clay	bedrock	6.6 - 8.4	0.06 - 0.6	0.13 - 0.20	0 - 2
Partri	40		60+	silt loam	clay loam	gravelly clay loam	6.6 - 8.4	0.06 - 2.0	0.14 - 0.21	0 - 2
Conchas-Latom		1-7								
Conchas	45		30	loam	clay loam	bedrock	7.4 - 9.0	0.2 - 2.0	0.16 - 0.21	0 - 2
Latom	40		10	fine sandy loam	bedrock		7.9 - 8.4	0.6 - 2.0	0.10 - 0.15	0 - 2
Crews-Tricon		0-5								
Crews	45		16	loam	clay loam	indurated caliche	6.6 - 7.8	0.2 - 2.0	0.14 - 0.21	0 - 2
Tricon	40		33	silt loam	clay loam	indurated caliche	6.6 - 8.4	0.06 - 2.0	0.14 - 0.21	0 - 2
Gullied Land-Montoya		1-3								
Gullied Land	50			Variable: actively	eroding gullies					
Montoya	20		60+	clay loam	clay	clay	7.4 - 8.4	0.06 - 0.6	0.14 - 0.21	2 - 8
Lacita-San Jose		0-3								
Lacita	45		60+	silty clay loam	silty clay loam	silty clay loam	7.9 - 8.4	0.2 - 0.6	0.19 - 0.21	0 - 2
San Jose	30		60+	fine sandy loam	fine sandy loam	fine sandy loam	7.4 - 8.4	2.0 - 6.0	0.12 - 0.16	0 - 2

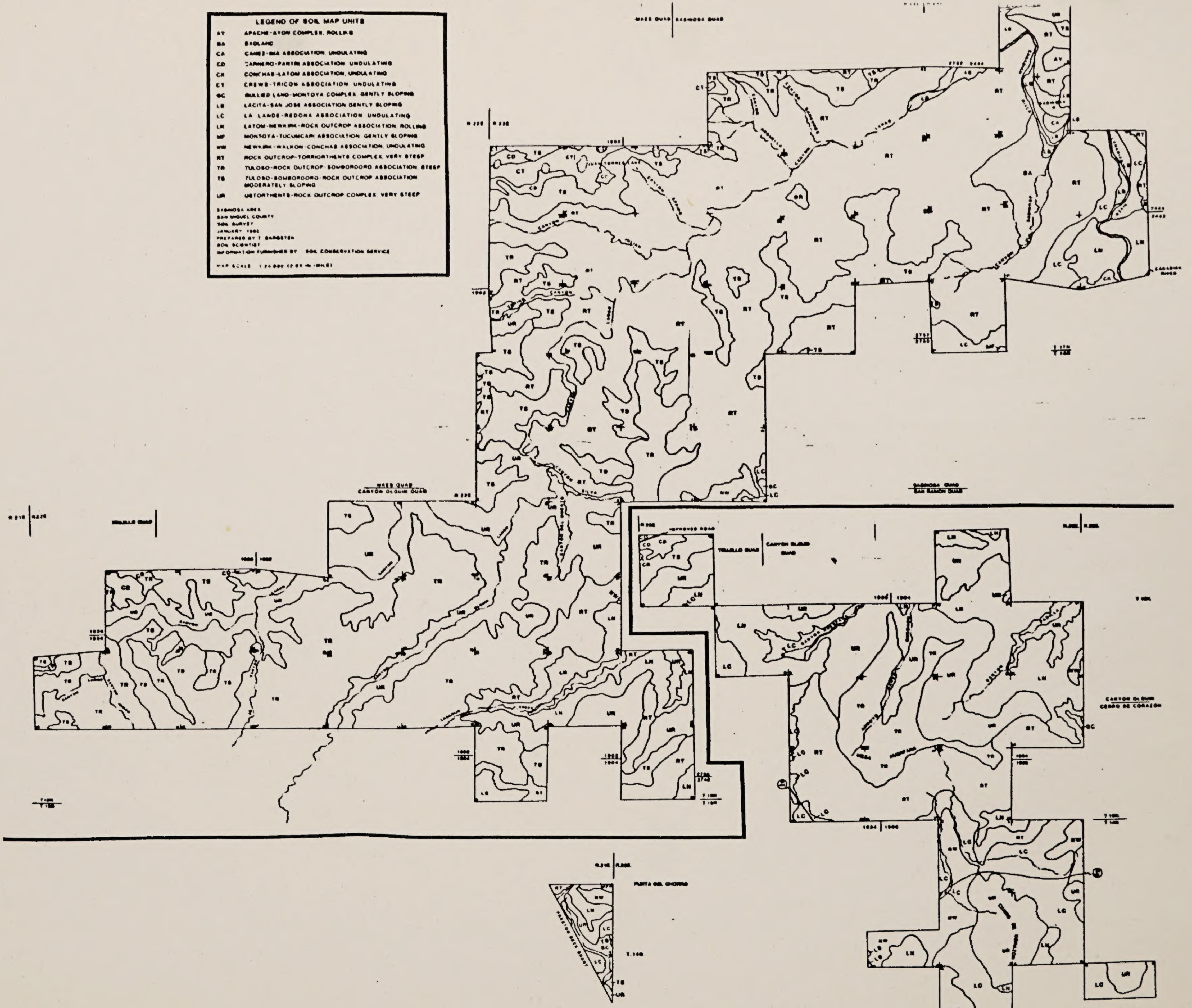
ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
La Lande-Redona		3-7								
La Lande	65		60+	sandy loam	loam	sandy clay loam	7.4 - 8.4	0.6 - 2.0	0.11 - 0.21	0 - 2
Redona	20		60+	loam	clay loam	clay loam	7.4 - 8.4	0.6 - 2.0	0.14 - 0.21	0 - 2
Latom-Newkirk-Rock outcrop		1-15								
Latom	50		13	fine sandy loam	fine sandy loam	bedrock	7.9 - 8.4	0.6 - 2.0	0.10 - 0.15	0 - 2
Newkirk	25		13	fine sandy loam	sandy clay loam	bedrock	6.6 - 8.4	0.6 - 6.0	0.11 - 0.20	0 - 2
Rock outcrop	15	--	--	--	--	--	--	--	--	--
Montoya-Tucumcari		0-3								
Montoya	45		60+	clay loam	clay	clay	7.4 - 8.4	0.06 - 0.6	0.14 - 0.21	2 - 8
Tucumari	30		60+	loam	silty clay loam	silty clay loam	6.6 - 8.4	0.2 - 2.0	0.14 - 0.21	2 - 4
Newkirk-Walkon-Conchas		1-7								
Newkirk	45		13	sandy loam	sandy clay loam	bedrock	6.6 - 8.4	0.6 - 6.0	0.11 - 0.20	0 - 2
Walkon	25		31	fine sandy loam	clay loam	bedrock	6.6 - 8.4	0.06 - 6.0	0.14 - 0.21	0 - 2
Conchas	20		30	loam	clay loam	bedrock	7.4 - 9.0	0.2 - 2.0	0.16 - 0.21	0 - 2
Rock outcrop-Torriorthents		15-100								
Rock outcrop	70		--	--	--	--	--	--	--	--
Torrorthents	20			Highly Variable						
Tuloso-Rock outcrop-Sombordoro		1-35								
Tuloso	35		11	stony sandy loam	very stony loam	bedrock	6.6 - 7.8	0.6 - 6.0	0.07 - 0.11	0 - 2
Rock outcrop	35	--	--	--	--	--	--	--	--	--
Sombordoro	20		16	very stony fine sandy loam	extremely stony clay	bedrock	7.4 - 8.4	0.06 - 6.0	0.04 - 0.11	0 - 2

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

3 of 3

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
Tuloso-Sombordoro-Rock outcrop		1-15								
Tuloso	40		11	stony loam	very stony loam	bedrock	6,6 - 7,8	0,6 - 6,0	0,07 - 0,11	0 - 2
Sombordoro	30		11	very stony loam	stony sandy loam	bedrock	7,4 - 8,4	0,06 - 6,0	0,04 - 0.11	0 - 2
Rock outcrop	25	--	--	--	--	--	--	--	--	--
Ustorthents-Rock outcrop		15-100								
Ustorthents	40			Highly Variable						
Rock outcrop	40	--	--	--	--	--	--	--	--	--


MAES QUAD
SABINOSA QUAD
MAES QUAD
CAÑYON OLGUIN QUAD
SABINOSA QUAD
SAN RAMON QUAD
TRUJILLO QUAD
CANYON OLGUIN QUAD
IMPROVED ROAD
CANYON OLGUIN
CERRO DE CORAZON
PUNTA DEL CHORRO
R 22E
R 23E
R 21E
R 22E
AV
BA
CA
CD
CT
GC
LB
LC
LN
NW
RT
TR
TB
UR

LEGEND OF SOIL MAP UNITS

AV	APACHE-AVON COMPLEX, ROLLING
BA	BADLAND
CA	[illegible] ASSOCIATION, UNDULATING
CD	CARNERO-PARTRI ASSOCIATION, UNDULATING
CK	CONCHAS-LATOM ASSOCIATION, UNDULATING
CT	CREWS-TRICON ASSOCIATION, UNDULATING
GC	GULLIED LAND-MONTOYA COMPLEX, GENTLY SLOPING
LB	LACITA-SAN JOSE ASSOCIATION GENTLY SLOPING
LC	LA LANDE-REDONA ASSOCIATION UNDULATING
LN	LATOM-NEWKIRK-ROCK OUTCROP ASSOCIATION, ROLLING
MF	MONTOYA-TUCUMCARI ASSOCIATION GENTLY SLOPING
NW	NEWKIRK-WALKON-CONCHAS ASSOCIATION, UNDULATING
RT	ROCK OUTCROP-TORRIORTHENTS COMPLEX, VERY STEEP
TR	TULOSO-ROCK OUTCROP-BOMBORDORO ASSOCIATION, STEEP
TB	TULOSO-BOMBORDORO-ROCK OUTCROP ASSOCIATION MODERATELY SLOPING
UR	USTORTHENTS-ROCK OUTCROP COMPLEX, VERY STEEP

SABINOSA AREA
SAN MIGUEL COUNTY
SOIL SURVEY
JANUARY 1980
PREPARED BY T. BARGSTEN
SOIL SCIENTIST
INFORMATION FURNISHED BY SOIL CONSERVATION SERVICE

MAP SCALE 1:24,000 (2.64 IN./MILE)

RIO GRANDE

SOIL ASSOCIATIONS:
MAPS, TABLES, DESCRIPTIONS

SOILS: RIO GRANDE RESOURCE AREA

Soil Associations

Estimated Physical and Chemical Properties

Interpretations for Selected Uses of Major Soils

T. Bargsten
Soil Scientist
Albuquerque District Office

January 9, 1978

SOIL ASSOCIATIONS OF THE RIO GRANDE RESOURCE AREA

A soil association is a distinctive, proportioned pattern of soils on the landscape. It usually consists of one or more major soils and at least one minor soil; it is named for the major soil. The soils in one association may occur in another, but in a different pattern.

Soil associations (and the General Soils Map) give a relative indication of the relationship of soils in the area. They are useful for comparing different parts of an area or in locating large tracts that are suitable for certain uses or have particular limitations to use. They are a general guide in managing a watershed or other land delineation, and ore useful in making broad planning decisions for an area. They are not suitable for planning the management or use of a specific location, because the soils in an association ordinarily differ in depth, texture, slope, and other characteristics.

Thirty soil associations have been delineated in the Rio Grande Resource Area. A short description of each association follows, and must be used in conjunction with the "Table of Physical and Chemical Characteristics" and table of "Interpretation for Selected Uses of Major Soils". These tables provide specific information about each soil within an association, and list degrees and kinds of limitations for certain uses.

1. Fernando-Tenorio-Silva Association

   This association occurs primarily in the area extending westward from the base of the Sangre de Cristo Mountains to the Rio Grande Gorge. Soils are deep (over 40 inches in depth), with surface textures ranging from loam to clay loam and overlying loam to very gravelly sand substrata. The soils are used mainly as range, and have moderate potential for range improvement.

2. Royosa-Vibo-Montecito Association

   Soils in this association are deep, nearly level to moderately sloping, and well drained. They occur in the southwest portion of Taos County. Surface texture ranges from loam to loamy sand; the soils overlie sandy and gravelly material. Rangeland is the major use of these soils.

3. Manzano-Loveland-Caruso Association

   Soils in this association are deep and nearly level to gently sloping. They occur on floodplains, terraces, and alluvial fans along streams originating in the Sangre de Cristo Mountains. Loveland soils are poorly drained and have a seasonal watertable within 6 inches of the surface. The major part of this association is used for hay and pasture land.

4. Travelers-Luhon-Stunner Association

This association occurs mainly in the northern half of Taos County. The soils are shallow to deep on nearly level to moderately sloping topography. Travelers soils are shallow over basalt. Surface textures are stony, cobbly or gravelly loam. The association is used as range.

5. Petaca-Servilleta-Hernandez Association

These soils occur in the west-central part of Taos County. Petaca and Servilleta soils overlie basalt bedrock at depths ranging from 10 to 40 inches. Hernandez soils are deep and have loam to clay loam textures throughout the profile. This association is used as rangeland.

6. Raton-Rock Outcrop-Orejas Association

This association occurs as widely scattered basalt hills and mountains in the western part of Taos County and the eastern part of Rio Arriba County. Soils are shallow over basalt, and slopes are strongly sloping to steep. They are cobbly and stony throughout. Primary use is as wildlife habitat and range.

7. Orthents-Amalia-Devisadero Association

These soils occur primarily on the west-facing slopes of the Sangre de Cristos in Taos County. They are moderately deep to deep over bedrock, and are on steep to very steep

mountain sideslopes. Soil textures are gravelly throughout the profile. The association is used as wildlife habitat.

8. Apache-Silver-Rockland Association

This soil association occurs in the eastern part of Sandoval and Los Alamos Counties. Soils are developing in materials of volcanic origin on old lava flows and basalt mesas. They are stony and rocky. The land surface is gently sloping to moderately steep. Rangeland is the predominate use.

9. Trampas-Ustorthents-Mirand Association

These are deep, strongly sloping to steep soils on plateaus and mountain sideslopes in the eastern part of Taos County. Soil textures are cobbly to gravelly loam, clay or clay loam. The association is used for timber production, wildlife habitat, and limited grazing.

10. Eutroboralfs

This association includes extensive areas of mountainous land in the north-central and south-eastern parts of Rio Arriba County. The soils are developing in parent materials weathered predominately from sedimentary rocks. Texture of the surface and subsoil layers ranges from loam or gravelly loam to clay or clay loam. Vegetative cover is dominated by trees and shrubs (ponderosa pine is dominant; gambel oak,

mountain mahogany, and serviceberry are the predominate shrubs). Wildlife habitat, forestry and range are major uses.

11. Argiborolls-Haploborolls Association
Soils in this association are moderately deep to shallow over shale bedrock. Textures vary from silty clay loam to clay. Slopes are strongly sloping to steep. The association occurs in the north and central parts of Rio Arriba County. The soils are used for rangeland and as wildlife habitat.

12. Eutroboralfs-Haploborolls Association
This association is located in the northeastern and southcentral parts of Rio Arriba County. Soils are developing on moderately sloping to steep mountain sideslopes and ridges or mesa tops. They are shallow to moderately deep over tuff, pumice, or rhyolites. Textures range from sandy loam to clay loam. The association is used as rangeland and wildlife habitat and for recreation.

13. Nambe-Cundiyo Association
The soils in this are developing in glacial till and mixed alluvium on strongly sloping to very steep mountain sideslopes in the northeastern part of Rio Arriba County. Soils are cobbly or stony throughout the profile. Timber production, wildife habitat and range are the major uses.

14. Rockland-Rough Broken Land Association

This association is characterized by rough and broken topography, very steep slopes and rock outcrops. There are escarpments, canyon walls, and breaks, all of which are dominated by rock outcrops and small areas of highly variable soils. Wildlife habitat is the predominate use. This association occurs throughout the area.

15. Los Alamos-Bidman-Millet Association

Soils in this association are deep over gravelly substrata. Surface textures range from loam to gravelly sandy clay loam. The soils occur on gently sloping to moderately steep alluvial fans, terraces, and valley-filling sideslopes in the area west of the Rio Grande and Rio Chama Rivers in Rio Arriba County. The area is dissected by numerous drainageways and arroyos. The association is used as wildlife habitat and rangeland.

16. Majada-Calabasas-Apache Association

This association occurs in the southeastern part of Rio Arriba County, with like areas in Santa Fe and Sandoval counties. Soils range from shallow to deep over basaltic parent material; textures are loam to stony sandy clay loam. The land surface is dominantly gently to strongly sloping. These soils are used for range and wildlife habitat.

17. Las Lucas-Little-Persayo Association

This association occurs on gently to strongly sloping and rolling uplands in the central part of Rio Arriba County and the southwestern part of Sandoval County. The soils are silty clay loam to clay in texture, and are shallow to moderately deep over shale. The association is used primarily as rangeland.

18. Green River-El Rancho-Werlow Association

This association consists of nearly level to gently sloping floodplains and associated upland areas of the Rio Chama and Rio Grande Rivers in the southeastern part of Rio Arriba County. Soils are deep, and textures range from sandy clay loam to loamy sand. The portions of this association that are not irrigated are used for limited grazing by livestock and wildlife.

19. El Rancho-Fruitland Association

The soils of this association occur in the northern part of the Santa Fe County on level to gently sloping alluvial fans and terraces. Fruitland soils are on alluvial fans close to the channels where alluvial deposition has been relatively rapid. El Rancho soils occur on adjacent terraces. Soil textures range from sandy clay loam to sandy loam.

20. Las Lucas-Pojoaque Association

This association consists of moderately deep to deep soils overlying shale. The soils occur on level to hilly mountain sides and dissected, eroded upland terraces in the south-central part of Santa Fe County. Soil textures range from loam to gravelly sandy clay loam. The association is used for range and wildlife habitat.

21. Panky-Pojoaque-Harvey Association

These deep soils occur on level to hilly terraces and old alluvial fans in the central part of Santa Fe County. Loams, clay loam, sandy loam, and sandy clay loam are the predominate textures. The soils of this association are used as range and wildlife habitat.

22. Redman-Pena-Stony Rockland Association

This association consists of deep, loamy to clayey and very gravelly soils on alluvial fans and terraces, and steep to very steep rockland areas with small inclusions of highly variable soils. These soils are used as ranges and wildlife habitat; they occur in the southwestern part of Santa Fe County.

23. Chimayo-Mirabal-Supervisor Association

This association consists of shallow to moderately deep soils developing in material weathered from granite, gneiss, and schist. It is in the northeastern part of Santa Fe

County. Slopes are moderately sloping to very steep. Soil textures range from stony loam to very stony or very gravelly sandy loam. Timber production, range, wildlife habitat, and recreation are major uses.

24. Gila-Vinton-Glendale Association

This association includes the nearly level to gently sloping flood plains of the Rio Grande in the southeastern part of the area. Soils are deep, with textures ranging from loamy sand to silty clay loam. These soils are highly stratified. The majority of these soils are under irrigation.

25. Christianburg-Navajo Association

The soils of this association occur in the western part of the area, mainly in valley bottoms and on flood plains and terraces adjacent the larger intermittent drainages. Soil textures are clay to clay loam; they are highly susceptible to gullying. Deep, vertical walled gullies are numerous. They have salinity and alkali problems. Most of this association is used as range.

26. Madurez-Caliza-Wink Association

This association occurs dominantly on gently to strongly sloping and undulating uplands in the south-central area between the Rio Grande and the Rio Puerco. Soils are deep,

with textures ranging from sandy loam to very gravelly loamy sand. They have a high erosion hazard. Rangeland is the predominate use.

27. Sheppard-Rough Broken Land Association

Soils of this association are deep, loamy sands on rolling uplands and steep, dissected mesa breaks. The rough broken land consists of a complex of shallow soils with highly variable texture and outcrops of sandstone, conglomerates, clays or other materials of the Santa Fe Formation. The association occurs in the south-central part of the area, west of the Rio Grande. Rangeland and wildlife habitat are the principal uses.

28. Rough Broken Land - Embudo Association

This association occurs in the southeastern part of Sandoval County on undulating to rolling and hilly upland dissected by numerous intermittent drainages and arroyos. Embudo soils are deep, gravelly sandy loam overlying gravelly loamy coarse sand. Rough broken land is a complex of shallow, highly variable soils and exposures of consolidated sedimentary deposists. The association is used for range and as wildlife habitat.

29. Travessilla-Persayo-Rockland Association

This association occurs in the southwestern part of Sandoval County. It is rough and broken topography including nearly

level to gently sloping small valley floors, strongly sloping and rolling uplands, and steep escarpments and breaks. Soils are shallow over sandstone or shale. Textures range from sandy loam to silty clay loam. Gully erosion is a moderate to severe hazard in the alluvial soils of the small valley floors. Rockland is a complex of sedimentary rock exposures and very shallow soils. Primary use is as range and wildlife habitat.

30. Pojoaque-Rough Broken Land Association

The soils of this association occur in the northern part of Santa Fe County. They are on moderately sloping to moderately steep upland terraces and rough broken land that is very shallow to sandstone, siltstone, and shale. Pojoaque soils are deep, and textures range from sandy clay loam to gravelly sandy clay loam. This association is used as range and as wildlife habitat.

31. Travessilla - Rock Outcrop - Bernal Association

Soils in this association are shallow over sandstone bedrock and occur mainly in the eastern part of Santa Fe County. They are developing on nearly level to moderately steep mesa tops and benches, and on mesa sideslopes. Soil textures are sandy loam to fine sandy loam. Major uses are for livestock grazing and wildlife habitat.

32. Laport - Witt Association

This association consists of well-drained soils that are developing in limestone residium and mixed alluvium. It is in the southwestern part of Santa Fe County. Soils occur on nearly level to moderately steep foothills and alluvial fans. Surface textures are cobbly loam to clay loam. The association is used for range, and as wildlife habitat and watershed.

33. Witt - Harvey - Clovis Association

Soils in this association are deep and nearly level to moderately sloping. They occur on old upland alluvial fans in the southern part of Santa Fe County. Surface textures range from sandy clay loam to clay loam, overlying fine sandy loam to loam. Grazing by livestock is the major use.

34. Harvey - Dean - Tapia Association

These soils occur in the southeastern part of Santa Fe County, on nearly level to moderately sloping upland sideslopes and alluvial fans. Surface textures are loam or sandy clay loam overlying very gravelly loam or caliche. Primary use is for livestock grazing.

35. LaBrier - Willard Association

This association consists of deep, well drained soils that are developing in nearly level lake sediment and mixed alluvium. It occurs in the southern part of Santa Fe County. Surface textures are loam or clay loam, overlying clay loam. Primary use is for grazing by cattle.

36. Tres Hermanos - Madurez - Agustin Association

This association is on nearly level to moderately sloping piedmont uplands and alluvial fans east of the Rio Grande, in Valencia County. Surface textures range from fine sandy loam to gravelly loam that overlies sandy loam to gravelly sandy loam. The soils of this association are used as range, wildlife habitat, and watershed.

37. Fernando - Basalt Rockland Association

This association has soils that are developing on moderately sloping to very steep lava flows, hills, and basalt-capped mesas. It occurs in the southeastern part of Rio Arriba County. Fernando soils have a loam surface texture overlying silty clay loam substrata. Other soils are stony, or covered by cobble and stone. The association is used as wildlife habitat, range and watershed.

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
1. Fernando-Tenorio-Silva										
Fernando	45	1-7	60	silt loam, clay loam	clay loam	silt loam	7.9-9.0	0.2-2.0	0.14-0.21	< 2
Tenorio	25		60	loam	gravelly sandy clay loam	extremely gravelly sand	6.6-7.8	0.6-2.0;>20	0.03-0.18	< 2
Silva	20		60	loam	clay loam	clay loam	6.6-8.4	0.6-2.0	0.16-0.20	< 2
2. Royosa-Vibo-Montecito										
Royosa	35	2-9	60	loamy sand	loamy sand	loamy sand	6.6-7.8	20	0.05-0.08	< 2
Vibo	25		60	sandy loam	sandy clay loam	sandy loam	6.6-8.4	0.6-6.0	0.11-0.16	< 2
Montecito	10		60	loam	clay loam, gravelly clay loam	very gravelly sandy loam	6.6-8.4	0.2-2.0	0.09-0.18	< 2
3. Manzano-Loveland-Caruso										
Manzano	40	2-5	60	clay loam	clay loam	clay loam	7.4-7.8	0.2-0.6	0.16-0.21	< 2
Loveland	15		60	clay loam, loam	loam, clay loam	very gravelly sand	6.6-8.4	0.2-6.0+	0.03-0.20	2-4
Caruso	10		60	silty clay loam	clay loam	very fine sandy loam	7.4-8.4	0.6-2.0	0.16-0.23	< 2
4. Travelers-Luhon-Stunner										
Travelers	35	2-9	10-20	very stony loam	very stony loam	unweathered bedrock	7.9-8.4	0.6-2.0	0.06-0.09	< 2
Luhon	25		60	gravelly loam	gravelly clay loam	loam, gravelly clay loam	7.9-9.0	0.6-2.0	0.11-0.19	2-8
Stunner	20		60	cobbly loam	clay loam	loam, gravelly loam	7.4-8.4	0.6-2.0	0.14-0.20	< 4
5. Petaca-Servilleta-Hernandez										
Petaca	20	2-9	10-20	stony loam	stony loam, cobbly loam, very gravelly sandy loam	unweathered bedrock	7.4-8.4	0.6-2.0	0.08-0.17	< 2
Servilleta	20		20-40	silty clay loam	silty clay loam	unweathered bedrock	6.6-9.0	0.06-0.6	0.14-0.21	< 2
Hernandez	15		60	loam	clay loam	clay loam	7.4-8.4	0.6-2.0	0.12-0.18	< 2

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
6. Raton-Rock Outcrop-Orejas										
Raton	25	9-50	10-20	very stony silt loam	very stony clay	unweathered bedrock	6.6-7.3	0.06-0.6	0.08-0.12	<2
Rock Outcrop	25		--	--	--	--	--	--	--	--
Orejas	10		10-20	very stony loam	cobbly clay loam	unweathered bedrock	6.6-7.8	0.06-2.0	0.07-0.12	<2
7. Orthents-Amalia-Devisadero										
Orthents	20	30-75	--	--	--	--	--	--	--	--
Amalia	15		60	gravelly loam	gravelly clay loam	gravelly sandy loam	6.6-8.4	0.6-2.0; 6.0-20	0.06-0.17	<2
Devisadero	15		20-40	gravelly loam	very gravelly clay, very gravelly sandy loam	unweathered bedrock	7.4-8.4	0.2-6.0	0.05-0.17	<2
8. Apache-Silver-Rockland										
Apache	60	0-9	10-20	stony fine sandy loam	stony loam	basalt	7.9-9.0	0.6-2.0	0.11-0.14	<2
Silver	10	0-5	60	loam	clay loam	loam, clay loam	7.3-8.4	0.06-2.0	0.14-0.20	<2
Rockland	20	5-50	--	--	--	--	--	--	--	--
9. Trampas-Usthorthents-Mirand										
Trampas	25	9-50	60	cobby sandy loam, cobbly loam	extremely cobbly sandy clay loam	extremely gravelly clay stony clay loam	6.1-7.3	0.06-2.0	0.06-0.09	<2
Ustorthents	15		--	--	--	--	--	--	--	--
Mirand	10		60	cobby loam	clay, cobbly clay	sandy clay	6.6-7.3	0.06-2.0	0.08-0.16	<2
10. Eutroboralfs	--	9-50	60	loam, gravelly sandy clay loam	clay, clay loam	clay loam	6.1-7.3	0.06-2.0	0.15-0.21	<2
11. Argiborolls-Haploborolls										
Argiborolls	50	9-50	20-40	clay loam	clay	shale	6.1-7.3	0.06-0.6	0.13-0.15	<2
Haploborolls	20	9-50	10-20	clay loam	silty clay loam	shale	7.3-8.4	0.06-2.0	0.13-0.17	<2

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
12. Eutoboralfs-Haploborolls										
Eutroboralfs	40	5-50	30-40	loam	clay loam	tuff, basalt	6.1-7.3	0.6-2.0	0.17-0.21	< 2
Haploborolls	25	15-75	10-20	sandy loam	sandy loam	rhyolites	6.6-7.8	2.0-6.0	0.11-0.15	< 2
13. Nambe-Cundiyo										
Nambe	55	15-75	60	cobbly sandy loam	stony sandy loam	very cobbly sandy loam	4.5-5.0	2.0-6.0	0.07-0.09	< 2
Cundiyo	25	30-75+	60	cobbly sandy loam	very cobbly loam	very cobbly loamy sand	6.1-7.3	2.0-6.0	0.08-0.11	< 2
14. Rockland-Rough Broken Land										
Rockland	70	30-75+	--	--	--	--	--	--	--	--
Rough broken land	15	15-75	--	--	--	--	--	--	--	--
15. Los Alamos-Bidman-Millet										
Los Alamos	20	2-9	60	sandy loam, loam	gravelly sandy loam	pumice, ash	7.4-9.0	0.6-6.0	0.11-0.18	< 2
Bidman	20		60	loam	clay, clay loam	clay loam	6.1-8.4	0.06-0.6	0.14-0.21	< 2
Millet	20		60	gravelly sandy loam	gravelly sandy clay loam	very gravelly sandy loam	6.6-7.3	0.6-20+	0.06-0.13	< 2
16. Majada-Calabasas-Apache										
Majada	25	2-50	60	cobbly fine sandy loam	very cobbly sandy clay loam	very cobbly loam	6.6-7.8	0.2-0.6; 2.0-6.0	0.08-0.21	< 2
Calabasas	25		60	loam	clay loam	gravelly loam	7.4-8.4	0.6-2.0	0.18-0.20	< 2
Apache	15		10-20	stony fine sandy loam	stony sandy clay loam	bedrock	7.9-8.4	0.6-2.0	0.11-0.14	< 2
17. Las Lucas-Litle-Persayo										
Las Lucas	30	3-5	40-60	loam	clay loam	shale	7.9-9.0	0.06-2.0	0.15-0.20	< 2
Litle	25	3-5	20-40	clay loam	clay	shale	7.4-8.4	0.06-0.6	0.12-0.21	2-8
Persayo	25	1-9	10-20	silty clay loam	silty clay loam	shale	7.9-8.4	0.2-0.6	0.15-0.19	2-8
18. Green River-El Rancho-Werlow										
Green River	20	0-3	60	loam	loamy sand/silt loam	loamy sand	7.4-8.4	0.6-2.0; 2.0-20	0.09-0.16	2-8
El Rancho	20	0-5	60	sandy loam	sandy clay loam	sandy clay loam	7.9-8.4	0.6-2.0	0.14-0.16	< 2
Werlow	20	0-3	60	loam	sandy clay loam	fine sandy loam	7.4-8.4	0.6-2.0	0.10-0.15	< 4

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
19. El Rancho-Fruitland										
El Rancho	40	1-5	60	sandy loam	sandy clay loam	sandy clay loam	7.9-8.4	0.6-1.0	0.14-0.16	4-8
Fruitland	20		60	sandy clay loam	fine sandy loam	fine sandy loam	7.9-8.4	0.6-6.0	0.11-0.13	4
20. Las Lucas-Pojoaque										
Las Lucas	30	1-15	40-60	loam	clay loam	shale	7.9-9.0	0.06-2.0	0.15-0.20	2
Pojoaque	30		60	sandy clay loam	sandy clay loam	gravelly sandy clay loam	7.4-7.8	0.6-2.0	0.13-0.15	4
21. Panky-Pojoaque-Harvey										
Pandy	35	1-15	60	loam	clay loam	sandy clay loam	7.4-9.0	0.06-2.0	0.09-0.18	2
Pojoaque	25		60	sandy clay loam	sandy clay loam	gravelly sandy clay loam	7.4-7.8	0.6-2.0	0.13-0.15	2
Harvey	20		60	sandy loam	sandy clay loam, clay loam	sandy clay loam	7.4-8.4	0.6-6.0	0.11-0.18	2
22. Rednun-Pena-Stony Land										
Rednun	50	2-30	60	loam	clay loam	loam, fine sandy loam	6.6-8.4	0.06-2.0	0.14-0.21	2
Pena	25		60	stony clay loam	very gravelly clay loam	very gravelly loam	7.9-8.4	0.6-2.0	0.04-0.12	2-4
Stony Land	15		--	--	--	--	--	--	--	--
23. Chimayo-Mirabal-Supervisor										
Chimayo	40	15-75	10-20	stony loam	very stony loam	bedrock	6.6-7.3	0.6-2.0	0.08-0.15	2
Mirabal	35		20-40	very stony loam	very stony loam	bedrock	6.1-6.5	2.0-6.0	0.07-0.09	2
Supervisor	20		20-40	gravelly sandy loam	gravelly sandy loam	bedrock	6.1-6.5	2.0-6.0	0.06-0.08	2
24. Gila-Vinton-Glendale										
Gila	30	0-1	60	loam, fine sandy loam	loam, silt loam	sandy loam	7.9-8.4	0.6-2.0	0.11-0.17	2-4
Vinton	20		60	fine sandy loam	loamy sand	loamy sand	7.9-8.4	2.0-6.0	0.06-0.12	2-4
Glendale	15		60	clay loam; silty clay loam	silty clay loam	silt loam	7.9-9.0	0.2-0.6	0.14-0.19	2-4

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
25. Christianburg-Navajo										
Christianburg	40	0-3	60	clay	clay	clay	8.4-9.0	0.0-0.5	0.14-0.17	4-8
Navajo	25		60	clay	clay	clay	8.4-9.0	0.0-0.5	0.15-0.18	8-16
26. Madurez-Caliza-Wink										
Madurez	45	1-9	60	loamy fine sand	sandy clay loam	loam, sandy clay	7.9-9.0	0.6-6.0	0.09-0.16	2
Caliza	15		10-20	gravelly sandy loam	very gravelly sandy loam	very gravelly loamy sand	7.9-8.4	2.0-6.0	0.05-0.10	2-4
Wink	15		60	sandy loam	sandy loam	sandy loam	7.9-8.4	2.0-6.0	0.09-0.13	2-4
27. Sheppard-Rough Broken Land										
Sheppard	70	3-9	60	loamy sand	loamy fine sand	sand, loamy sand	7.9-9.0	6.0-20.0	0.05-0.08	<2
Rough Broken Land	25	9-30	--	--	--	--	--	--	--	--
28. Rough Broken Land-Embudo										
Rough Broken Land	60	1-25	--	--	--	--	--	--	--	--
Embudo	15	1-9	60	gravelly fine sandy loam	gravelly sandy loam	gravelly loamy coarse sand	7.9-8.4	0.6-2.0; 20	0.04-0.13	<2
29. Travessilla-Persayo-Rockland										
Travessilla	30	3-25	6-20	sandy loam	sandy loam	bedrock	7.9-8.4	2.0-6.0	0.08-0.13	<2
Persayo	25	3-25	10-20	silty clay loam	silty clay loam	shale	7.9-8.4	0.2-0.6	0.15-0.19	2-8
Rockland	25	25-75	--	--	--	--	--	--	--	--
30. Pojoaque-Rough Broken Land										
Pojoaque	45	5-30	60	sandy clay loam	sandy clay loam	gravelly sandy clay loam	7.4-7.8	0.6-2.0	0.13-0.15	<4
Rough Broken Land	45	--	--	--	--	--	--	--	--	--

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE			Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
				Surface	Underlying Layer	Substratum				
31. Travessilla-Rock Outcrop-Bernal										
Travessilla	25	2-25	6-20	sandy loam	sandy loam	sandstone bedrock	7.4-7.8	0.63-2.0	0.14-0.18	<2
Rock Outcrop	20	2-75	--	--	--	--	--	--	--	--
Bernal	15	1-5	10-20	fine sandy loam	clay loam	sandstone bedrock	6.6-7.3	2.0 -6.3	0.13-0.15	<2
Other Soils	40	--	--	--	--	--	--	--	--	--
32. Laporte-Witt										
Laporte	65	2-30	8-20	cobbly loam	cobbly sandy clay loam	limestone bedrock	8.5-9.0	0.63-2.0	0.12-0.14	2-4
Witt	25	2-30	60	clay loam	clay loam	loam	7.9-9.0	0.63-2.0	0.16-0.18	2-8
33. Witt-Harvey-Clovis										
Witt	50	1-9	60	clay loam	clay loam	loam	7.9-9.0	0.63-2.0	0.16-0.18	2-8
Harvey	30	2-9	60	sandy clay loam	clay loam	sandy clay loam	7.9-8.4	0.63-2.0	0.16-0.18	2-4
Clovis	15	2-9	60	clay loam	sandy clay loam	fine sandy loam	7.9-8.4	0.63-6.3	0.10-0.19	2-4
34. Harvey-Dean-Tapia										
Harvey	30	5-9	60	sandy clay loam	clay loam	sandy clay loam	7.9-8.4	0.63-2.0	0.16-0.18	2-4
Dean	25	1-5	60	loam	very gravelly loam, or caliche	very gravelly, loam or caliche	7.9-9.0	0.06-2.0	0.16-0.18	4-8
Tapia	15	1-5	60	loam	clay loam	gravelly loam	7.9-9.0	0.63-2.0	0.11-0.21	2-8
35. LaBrier-Willard										
LaBrier	70	0-2	60	clay loam	clay loam	clay loam	7.9-8.4	0.06-0.2	0.18-0.20	2-4
Willard	15	0-2	60	loam	clay loam	clay loam	8.5-9.0	0.20-2.0	0.05-0.18	8-16

ESTIMATED PHYSICAL AND CHEMICAL CHARACTERISTICS OF SOILS

Soil, Soil Association or Land Type	Percent of Association	Slope Percent	Depth to Bedrock (In.)	TEXTURE Surface	TEXTURE Underlying Layer	TEXTURE Substratum	Reaction (pH)	Permeability (In./Hr.)	Water-holding Capacity (In./In.)	Salinity (MMHOS/CM)
36. Tres Hermanos-Madurez-Agustin										
Tres Hermanos	50	2-5	60	loam	loam	gravelly sandy loam	7.9-9.0	0.63-2.0	0.06-0.20	2-4
Madurez	20	2-5	60	fine sandy loam	sandy clay loam	sandy loam	7.9-9.0	0.63-6.3	0.09-0.16	2-8
Agustin	15	2-9	60	gravelly loam	gravelly loam	gravelly sandy loam	7.9-8.4	2.0 -6.3	0.11-0.15	<2
37. Fernando-Basalt Rockland										
Fernando	35	0-5	60	loam	silty clay loam	silty clay loam	7.9-9.0	0.2-2.0	0.14-0.21	<4
Basalt Rockland	30	25-75	--	--	--	--	--	--	--	--
Other soils	35	3-15	--	--	--	--	--	--	--	--

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	* SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Agustin	moderate	low	slight	severe-seepage, slope	moderate-seepage	slight	piping, low strength	good	good	poor, excessive fines
Amalia	high	low	severe slope	severe-slope, seepage small stones	severe-slope, seep.	severe-slope, small stones	seepage	poor-slope, small stones	poor-slope	fair-excess fines
Apache	low	low	severe-depth to bedrock	severe-depth to bedrock	severe-depth to bedrock	severe-depth to bedrock	thin layer piping	poor-thin layer, small stones	poor-thin layer	unsuited
Argiborolls	moderate	high	severe-depth, permeability	severe-depth, steep slopes	severe-depth too clayey	severe-depth too clayey	shrink-swell depth	poor-too clayey	poor-low strength	unsuited
Basalt Rockland	low	No Interpretations Made								
Bernal	high	low	severe-depth	severe-depth	severe-depth	severe-depth	depth	poor-depth	poor-depth to bedrock	unsuited
Bidman	low	high	severe-percs slowly	moderate-slope	moderate-too clayey	moderate-too clayey	shrink-swell, low strength	poor-thin layer	poor-low strength, shrink-swell	unsuited
Calabasas	moderate	moderate	moderate slope, percs slowly	moderate-seepage, slope	slight	mod. slope	low strength, piping, compressable	fair-slope	fair-low strength; shrink-swell	unsuited
Caliza	high	low	slight	severe-seepage	severe-seepage	severe-cut-banks cave	seepage, piping	poor-small stones	good	fair
Caruso	high	moderate	severe-floods, wetness	severe-floods, wetness	severe-floods, wetness	severe-floods wetness	low strength	fair-too clayey	fair-low strength	unsuited
Chimayo	moderate	low	severe-slope, depth to rock	severe-slope, depth to rock	severe-slope, depth to rock	severe-slope, depth, large stones	thin layer, large stones	poor-thin layer, large stones	poor-slope, thin layer	unsuited
Christianburg	moderate	high	severe-percs slowly	slight	severe-too clayey	severe-too clayey	low strength, shrink-swell	poor-too clayey	poor-shrink-swell, low strength	unsuited
Clovis	low	moderate	moderate-permeability	moderate-slope, permeability	fair-permeability	slight	piping	fair	poor-excess fines	unsuited
Cundiyo	moderate	low	severe-slope	severe-slope, seepage	severe-slope seepage	severe-slope small stones	slope, seepage	poor-slope, small stones	poor-slope	poor-excess fines, large
Dean	low	low	severe-permeability	severe-slope, caliche	moderate-seepage, caliche	moderate-caliche	piping, caliche	poor-highly calcareous	fair-caliche	fair to good - caliche gravel

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	*SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Devisadero	high	moderate	severe-slope, depth to rock	severe-slope, depth to rock, seepage	severe slope depth to rock, seepage	severe-slope, depth to rock	thin layer, low strength	poor-slope, small stones	poor-slope, thin layer	unsuited
El Rancho	high	moderate	moderate-percs slowly	moderate-seepage	slight	slight	low strength, shrink-swell	fair-too clayey	fair-low strength, shrink-swell	unsuited
Embudo	moderate	low	slight	severe-seepage	severe-seepage	slight	seepage, piping, erodes easily	poor-small stones	good	poor-excess fines
Eutroboralfs	moderate	high	severe-slope, percs slowly	severe-slope	severe-slope	severe-too clayey, slope	low strength	fair-thin layer	poor-low strength, shrink-swell	unsuited
Fernando	moderate	moderate	severe-percs slowly	moderate-slope	slight	moderate-too clayey	low strength, piping	fair-too clayey	fair-low strength, shrink-swell	unsuited
Fruitland	Moderate	low	slight	severe-seepage	slight	slight	piping, seepage	good	fair-low strength	poor-excess fines
Gila	low	low	moderate-floods, percs slowly	severe-floods	moderate-floods	moderate-floods	piping, hard to pack, low strength	good	fair, low strength	unsuited
Glendale	high	moderate	severe-percs slowly	slight	moderate-too clayey	moderate-too clayey	piping, compressable	fair-too clayey	poor-low strength	unsuited
Green River	moderate	low	severe wetness	severe-wetness, floods	severe-wetness, seepage	severe-wetness	low strength, piping	good	poor-frost action	unsuited
Haploboralls	high	moderate	severe-depth to bedrock	severe-slope, depth to bedrock	severe-depth, slope	severe-depth to bedrock	piping, low strength	poor-thin layer	poor-slope, thin layer, low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	*SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Harvey	moderate	moderate	moderate-percs slowly, slope	severe-seepage, slope	slight	moderate-slope	low strength, piping, compressable	poor-excess fines	fair, low strength, shrink-swell	unsuited
Hernandez	low	high	moderate-percs slowly	moderate-seepage, slope	slight	slight	low strength	fair-too clayey	fair-low strength, shrink-swell	unsuited
LaBrier	low	moderate	severe-flood hazard	severe-flood hazard	severe-flood hazard	slight	low strength	fair-too clayey	poor: shrink swell	unsuited
Laporte	low	moderate	severe-depth	severe-depth	severe-depth	severe-depth	depth to bedrock	poor-stones	poor-depth	unsuited
Las Lucas	moderate	moderate	severe-percs slowly	moderate-depth to bedrock	moderate-depth to bedrock	moderate too clayey	piping, low strength	fair-too clayey	poor-low strength	unsuited
Litle	moderate	high	severe-percs slowly, depth to bedrock	severe-depth to rock	severe-depth to rock	severe-too clayey	low-strength, compressable	poor-too clayey, thin layer	poor-shrink-swell, low strength	unsuited
Los Alamos	moderate	moderate	slight	severe-seepage	severe-seepage	slight	low strength, piping	good	fair-shrink-swell, low strength	poor-excess fines
Loveland	moderate	moderate	severe-wetness, floods	severe, wetness, floods, seepage	severe-wetness, floods seepage	severe-wetness, floods, cutbanks	piping, low strength	fair-wetness, too clayey	severe-wetness frost-action	good
Luhon	moderate	low	moderate-percs slowly	moderate-seepage, slope	moderate-too clayey	moderate-too clayey	piping, low strength, hard to pack	fair-thin layer	fair-low strength	unsuited
Madurez	high	moderate	slight	moderate-seepage	slight	slight	low strength, piping	poor-too clayey	fair-shrink-swell	unsuited
Majada	low	low	severe-slope	severe-slope, small stones	severe-slope small stones	severe-slope small stones	low strength, piping, compressible	poor-slope small stones	fair-low strength, slope, small stones	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	* SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Manzano	moderate	high	severe-percs slowly	severe-floods	moderate-floods	moderate-floods	low strength	fair-too clayey	fair-low strength, shrink swell	unsuited
Millet	low	moderate	slight	severe-seepage	severe-seepage, small stone	moderate-cut-banks cave, small stones	seepage, small stones	poor-small stones	good	poor-excess fines
Mirabal	moderate	low	severe-depth to rock, slope, large stones	severe-depth to rock, seepage, slope	depth to rock, slope severe seepage	severe-depth to rock slope	thin layer, seepage, piping	poor slope, large stones	poor-slope, thin layer	unsuited
Mirand	moderate	high	severe-percs slowly	severe-slope	severe-too clayey	severe-too clayey	hard to pack, low strength	poor-too clayey	poor-low strength, shrink-swell	unsuited
Montecito	low	moderate	severe-percs slowly	severe-slope	moderate-too clayey, slope, small stones	severe-slope	low strength, hard to pack	poor-too clayey	poor-low strength; shrink-swell	unsuited
Nambe	high	low	severe-slope	severe-large stones, seepage, slope	severe-large stones seepage, slope	severe-large stones, slope	seepage, slope	poor-large and small stones	poor-slope	unsuited
Navajo	low	high	severe-percs slowly, floods	severe-floods	severe-too clayey, floods	severe-too clayey, floods	shrink-swell, low strength	poor-too clayey	poor-shrink-swell, low strength	unsuited
Orejas	moderate	moderate	severe-depth to rock, percs slowly, slope	severe-depth to rock, slope	severe-depth to rock, slope	severe-depth to rock slope	depth to rock, large stones	poor-large stones, slope	poor-thin layer, low strength	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	LIMITATION FOR USE AS: SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	*SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	SUITABILITY AS A SOURCE OF: TOPSOIL	ROADFILL	SAND/ GRAVEL
Orthents	high	NO INTERPRETATIONS MADE								
Panky	moderate	high	severe-percs slowly	moderate to severe-slope	severe-too clayey	severe-too clayey	low strength, shrink-swell	poor-too clayey, thin layer	poor-low strength, shrink-swel	unsuited
Pena	low	low	severe-slope	severe-slope, seepage	moderate-slope, small stones	severe-slope,	seepage, slope small stones	poor-slope, small stone	fair-frost action, slope	poor-excess fines
Persayo	high	high	severe-depth to rock	severe-depth to rock	severe-depth to rock	moderate-depth to rock	thin layer, low strength	poor-thin layer, too clayey	poor-shrink-swell, low strength	unsuited
Petaca	low	low	severe-depth tb rock	severe-depth to rock	severe-depth to rock	severe-depth to rock	depth to rock	poor-large stones	poor-thin layer	unsuited
Pojoaque	moderate	moderate	moderate-slope percs slowly	severe-slope	moderate-slope	moderate-slope	low strength, piping, shrink-swell	fair-small stones	fair-low strength, shrink-swell small stones	unsuited
Raton	moderate	high	severe-percs slowly, depth large stones	severe-depth to rock large stones	too clayey, severe, depth, large stones	large stones too clayey, severe depth	large stones, thin layer	poor-slope, large stones	poor shrink-swell, thin layer	unsuited
Rednun	moderate	high	severe-percs slowly	severe-slope	moderate-too clayey	moderate-slope, too clayey	low strength, shrink-swell	poor-thin layer	poor-low strength	unsuited
Rockland	low		NO INTERPRETATIONS MADE							
Rock Outcrop	low		NO INTERPRETATIONS MADE							
Rough Broken Land	moderate		NO INTERPRETATIONS MADE							

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

			LIMITATION FOR USE AS:					SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	*SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Royosa	high	low	slight	severe-seepage	severe-seepage	severe-cutbanks cave	seepage, piping	poor-too sandy	good	poor-excess fines
Servilleta	moderate	moderate	severe-depth to rock, percs slowly	severe-depth to rock	severe-depth to rock	severe-depth to rock	low strength, depth to rock	poor-thin layer	poor-low strength, thin layer	unsuited
Silva (Silver)	low	moderate	severe-percs slowly	moderate-slope	moderate-too clayey	moderate-too clayey	low strength	poor-thin layer	shrink-swell poor-low strength	unsuited
Sheppard	high	low	slight	severe-seepage	moderate-seepage	severe-cutbanks cave	seepage, piping	poor-too sandy	good	unsuited
Stony Land	moderate		NO INTERPRETATIONS MADE							
Stunner	low	moderate	severe-percs slowly	moderate-seepage, slope	slight	slight	low strength, piping	poor-small stones	fair-low strength	unsuited
Supervisor	moderate	low	severe-depth, slope	severe-slope, seepage, depth to rock	severe-depth to rock, seepage	severe-depth to rock, small stones	small stones, seepage, depth to rock	poor-small stones, thin layer	poor-thin layer, slope	poor-excess fines thin layer
Tapia	low	moderate	moderate-permeability	moderate-slope	moderate-seepage	moderate-caliche gravel	piping, seepage	fair-depth	fair-excess fines	good--caliche gravel
Tenorio	moderate	moderate	slight	severe-seepage, small stones	severe-seepage	severe-small stones, cutbanks cave	seepage	fair-thin layer	good	good
Trampas	severe	low	severe-slope, percs slowly	severe-slope, small stones	severe-small stones	severe-slope, small stones	piping, low strength	poor-slope, small stones	fair-slope	unsuited
Travelers	low	low	severe-depth to rock	severe-depth to rock large stones	severe-depth to rock	severe-depth to rock	thin layer, large stones, piping	poor-large and small stones	poor-thin layer	unsuited

INTERPRETATIONS FOR SELECTED USES OF MAJOR SOILS

		LIMITATION FOR USE AS:							SUITABILITY AS A SOURCE OF:		
SOIL OR LAND TYPE	EROSION HAZARD	SHRINK SWELL	SEPTIC TANK FILTER FIELDS	SEWAGE LAGOONS SETTLING PONDS	* SANITARY LANDFILLS	SHALLOW EXCAVATIONS	EMBANKMENTS	TOPSOIL	ROADFILL	SAND/ GRAVEL
Tres Hermanos	slight	moderate	slight	moderate-permeability	moderate-seepage	slight	piping, seepage	fair to 17"	fair: shrink-swell	unsuited
Travessilla	high	low	severe-depth to rock	severe-depth to rock, seepage	severe-depth to rock, seepage	severe-depth to rock	thin layer, piping	poor-thin layer	poor-thin layer	unsuited
Ustorthents			NO INTERPRETATIONS MADE							
Vibo	high	moderate	moderate-slope	severe-slope	severe-seepage	moderate-slope	low strength, piping	fair-too clayey, slope	fair-frost action, low strength shrink-swell	poor-excess fines
Vinton	high	low	slight	severe-seepage	severe-seepage	severe-cutbanks cave	piping, seepage	fair-thin layer, too sandy	good	fair-excess fines
Werlow	moderate	moderate	moderate-permeability	severe-seepage	moderate-seepage	moderate-cutbanks cave	low strength, piping	fair-thin layer	fair-shrink-swell	poor-excess fines
Willard	low	moderate	severe-permeability	slight	slight	slight	piping, low strength	fair	poor-excess fines	unsuited
Wink	low	low	slight	severe-seepage	moderate-seepage	moderate-cutbanks cave	piping, seepage	poor-too sandy	good	unsuitable
Witt	low	moderate	moderate-permeability	moderate-seepage, slope	moderate-seepage	slight	piping, low strength	fair-too clayey	poor-excess fines	unsuited

* trench type landfill

SOIL ASSOCIATIONS:
MAPS, TABLES, DESCRIPTIONS

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE

U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
BUREAU OF LAND MANAGEMENT

NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

BERNALILLO COUNTY, AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO

Scale 1:316,800

SOIL ASSOCIATIONS*

DEEP SOILS ON FLOOD PLAINS AND DISSECTED TERRACES

1	Gila-Vinton-Brazito association: Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Grande
2	Bluepoint-Kokan association: Nearly level to steep, somewhat excessively drained or excessively drained sandy and gravelly soils on dissected terraces and alluvial fans
3	Hantz-Gila association: Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Puerco

DEEP SOILS ON ALLUVIAL FANS, MESAS, AND PIEDMONTS

4	Madurez-Wink association: Level to moderately sloping, well drained loamy soils on piedmonts
5	Tijeras-Embudo association: Level to moderately sloping, well drained loamy and gravelly soils on alluvial fans
6	Latene-Nickel association: Nearly level to moderately steep, well drained loamy and gravelly soils on mesas and fans

MODERATELY DEEP OR SHALLOW SOILS ON BASALT FLOWS

7	Alemeda-Akela association: Level to gently rolling, well drained loamy and cobbly soils

VERY SHALLOW TO DEEP SOILS ON UPLANDS

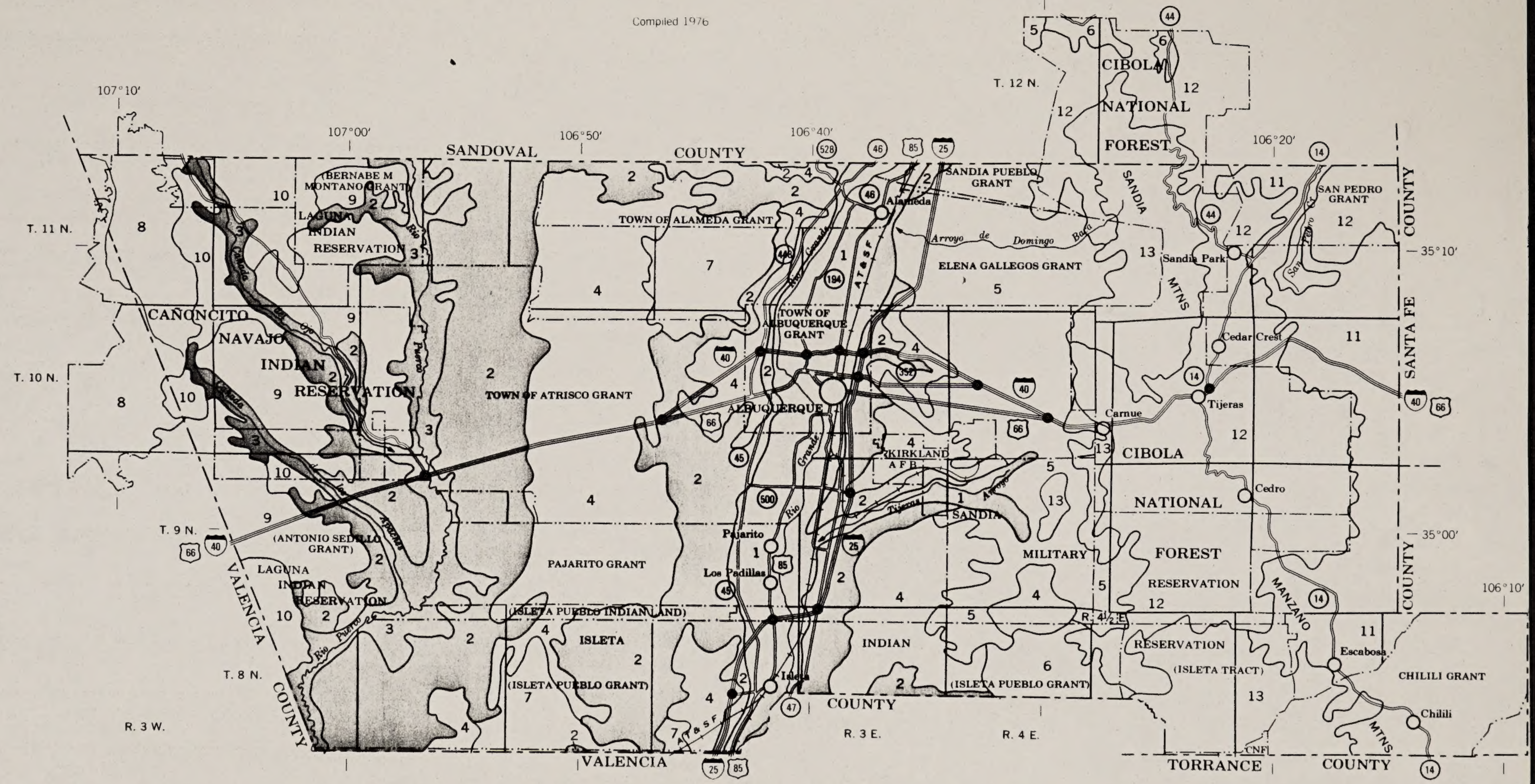
8	Penistaja-Travessilla-Bond association: Deep to very shallow, nearly level to strongly sloping, well drained loamy soils over sandstone
9	Penistaja-Otero association: Deep, nearly level to moderately sloping, well drained loamy soils underlain in places by sandstone
10	Shingle-Kim association: Deep to very shallow, level to gently rolling, well drained loamy soils over shale and sandstone
11	Silver-Witt-Laporte association: Deep to very shallow, level to moderately steep, well drained loamy soils underlain in places by limestone

SHALLOW TO DEEP SOILS ON MOUNTAINS AND FOOT SLOPES

12	Seis-Orthids association: Shallow or moderately deep, level to very steep, well drained, very cobbly, stony, and very stony loamy soils
13	Kolob-Rock outcrop association: Deep, moderately steep to very steep, well drained loamy and stony soils and Rock outcrop

* Terms for texture in the titles of associations refer to the texture of the surface layer of the major soils in the associations.

Compiled 1976


1 0 1 2 3 4 5 Miles
107°10′
107°00′
106°50′
106°40′
106°30′
106°20′
106°10′
35°10′
35°00′
T. 12 N.
T. 11 N.
T. 10 N.
T. 9 N.
T. 8 N.
R. 3 W.
R. 2 W.
R. 1 W.
R. 1 E.
R. 2 E.
R. 3 E.
R. 4 E.
R. 5 E.
R. 6 E.
R. 7 E.
SANDOVAL COUNTY
SANTA FE COUNTY
TORRANCE COUNTY
VALENCIA COUNTY
CIBOLA NATIONAL FOREST
SANDIA MTNS
MANZANO MTNS
BERNABE M MONTANO GRANT
LAGUNA INDIAN RESERVATION
CAÑONCITO NAVAJO INDIAN RESERVATION
TOWN OF ALAMEDA GRANT
TOWN OF ALBUQUERQUE GRANT
TOWN OF ATRISCO GRANT
SANDIA PUEBLO GRANT
ELENA GALLEGOS GRANT
SAN PEDRO GRANT
KIRKLAND A F B
SANDIA MILITARY RESERVATION
ISLETA INDIAN RESERVATION
(ISLETA PUEBLO GRANT)
(ISLETA PUEBLO INDIAN LAND)
(ISLETA TRACT)
PAJARITO GRANT
(ANTONIO SEDILLO GRANT)
CHILILI GRANT
ALBUQUERQUE
Alameda
Sandia Park
Cedar Crest
Tijeras
Carnue
Cedro
Escabosa
Chilili
Pajarito
Los Padillas
Isleta
Rio Grande
Rio Puerco
Arroyo de Domingo Baca
Cañada de los Apaches
AT & SF
CNF
25
40
66
85
14
44
45
46
47
194
352
448
500
528

is intended for general planning.
ineation can contain soils that
m those shown on the map. Refer
tailed soil map or inspect onsite
detailed planning.

Deep Soils on Flood Plains and Dissected Terraces

Soil associations 1, 2, and 3 are deep, level to steep, well drained to excessively drained loamy, sandy, and gravelly soils on flood plains, terraces, and alluvial fans in and along the Rio Grande, Rio Puerco, and Tijeras Arroyo Valleys. The soils formed in alluvium. The native vegetation is principally short and mid grasses and some shrubs. Elevations range from 4,900 to 6,000 feet.

1. Gila-Vinton-Brazito association

Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Grande

This association is on the level or nearly level flood plains and low terraces of the Rio Grande and Tijeras Arroyo Valleys. The native vegetation is mainly mid and short grasses, fourwing saltbush, and sand sagebrush. Elevations range from 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 185 days.

This association makes up about 7 percent of the survey area. It is about 33 percent Gila soils, 25 percent Vinton soils, 13 percent Brazito soils, and 29 percent Agua, Glendale, Anapra, and Armijo soils and the frequently flooded Torrifluvents.

Gila soils typically have a surface layer of calcareous brown loam. This layer is underlain by stratified very fine sandy loam and sandy loam. Beneath this is pale brown sand.

Vinton soils typically have a surface layer of brown sandy loam. The underlying layers are pale brown and pinkish gray loamy sand and pinkish gray very fine sand.

Brazito soils typically have a surface layer of light reddish brown and reddish brown silty clay loam. The underlying layer is light brown coarse sand.

The soils in this association are used for irrigated pasture and crops and for community development. Some small areas of wet, saline- and alkali-affected soils and soils that have a moderate or high shrink-swell potential are likely to limit engineering uses. Local areas need protection from flooding.

2. Bluepoint-Kokan association

Nearly level to steep, somewhat excessively drained or excessively drained sandy and gravelly soils on dissected terraces and alluvial fans

This association is mainly on the nearly level to steep dissected terraces east and west of the Rio Grande and Rio Puerco Valleys. The native vegetation is mainly mid and short grasses and broom snakeweed. Elevations range from about 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 195 days.

This association makes up 20 percent of the survey area. It is about 65 percent Bluepoint soils, 28 percent Kokan soils, and 7 percent Wink and Vinton soils, Rock outcrop, and Cut and fill land.

Bluepoint soils typically are pale brown loamy fine sand and loamy sand and light yellowish brown loamy sand. They formed in sandy alluvium partly modified by wind. These nearly level to rolling soils are mainly on broad, convex alluvial fans.

Kokan soils typically are very pale brown gravelly and very gravelly sand. They formed in old alluvial sand and gravel of mixed sources. These rolling to steep soils are on dissected terraces.

The soils in this association are used for range, wildlife habitat, watershed, and community development. Wildlife is mainly scaled quail and mourning dove. Kokan soils are a potential source of sand and gravel. The hazard of water erosion is moderate or severe. Sediment on this association is a major limitation. Local tracts are a source of Indian artifacts.

3. Hantz-Gila association

Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Puerco

This association is on the level or nearly level flood plain along the Rio Puerco and its tributaries. The major soils formed in alluvium derived primarily from shale. The native vegetation is mainly mid and short grasses and fourwing saltbush. Elevations range from about 5,000 to 6,000 feet. The mean annual precipitation is 7 to 14 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 185 days.

This association makes up about 3 percent of the survey area. It is about 62 percent Hantz soils, 35 percent Gila soils, and 3 percent Bluepoint and Penistaja soils on terraces and uplands.

Hantz soils typically have a surface layer of pale brown silty clay loam. This layer is underlain by light gray and light brownish gray silty clay. These soils are in swales and concave areas.

Gila soils typically have a surface layer of brown silty clay loam. This layer is underlain by stratified brown and light yellowish brown very fine sandy loam and sandy loam. These soils are in the slightly higher areas.

The soils in this association are used for range and wildlife habitat. Saline and alkali conditions are common.

Deep Soils on Alluvial Fans, Mesas, and Piedmonts

Soil associations 4, 5, and 6 are deep, level to moderately steep, well drained loamy and gravelly soils on the East and West Mesas. The soils formed in old, unconsolidated, mixed sandy and gravelly alluvium. The native vegetation is shrubs and short, mid, and tall grasses. Elevations range from 4,800 to 6,500 feet.

4. Madurez-Wink association

Level to moderately sloping, well drained loamy soils on piedmonts

This association is on the level to moderately sloping East and West Mesas. The major soils formed in old unconsolidated alluvium modified by wind. The native vegetation is mainly mid and short grasses and shrubs. Elevations range from 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 170 to 195 days.

This association makes up 16 percent of the survey area. It is about 53 percent Madurez soils, 27 percent Wink soils, and 20 percent Pajarito, Latene, and Embudo soils and Cut and fill land.

Madurez soils typically have a surface layer of brown fine sandy loam, a subsoil of brown sandy clay loam and light brown fine sandy loam, and a substratum of pink, pinkish gray, and light brown sandy loam. They are in slightly concave upland areas.

Wink soils typically have a surface layer of brown fine sandy loam and sandy loam, a subsoil of light brown sandy loam, and a substratum of pinkish gray and pinkish white sandy loam that is high in lime content. They are in slightly convex upland areas.

The soils in this association are used for range, watershed, wildlife habitat, and community development. Wildlife is mainly scaled quail, mourning dove, and antelope. Several tracts have been subdivided.

Deep Soils on Flood Plains and Dissected Terraces

Soil associations 1, 2, and 3 are deep, level to steep, well drained to excessively drained loamy, sandy, and gravelly soils on flood plains, terraces, and alluvial fans in and along the Rio Grande, Rio Puerco, and Tijeras Arroyo Valleys. The soils formed in alluvium. The native vegetation is principally short and mid grasses and some shrubs. Elevations range from 4,900 to [illegible] feet.

1. Gila-Vinton-Brazito association

Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Grande

This association is on the level or nearly level flood plains and low terraces of the Rio Grande and Tijeras Arroyo Valleys. The native vegetation is mainly mid and short grasses, fourwing saltbush, and sand sagebrush. Elevations range from 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 185 days.

This association makes up about 7 percent of the survey area. It is about 32 percent Gila soils, 22 percent Vinton soils, 18 percent Brazito soils, and 28 percent Agua, Glendale, Anapra, and Armijo soils and the frequently flooded Torrifluvents.

Gila soils typically have a surface layer of calcareous brown loam. This layer is underlain by stratified very fine sandy loam and sandy loam. Beneath this is pale brown sand.

Vinton soils typically have a surface layer of brown sandy loam. The underlying layers are pale brown and pinkish gray loamy sand and pinkish gray very fine sand.

Brazito soils typically have a surface layer of light reddish brown and reddish brown silty clay loam. The underlying layer is light brown coarse sand.

The soils in this association are used for irrigated pasture and crops and for community development.

Some small areas of wet, saline- and alkali-affected soils and soils that have a moderate or high shrink-swell potential are likely to limit engineering uses. Local areas need protection from flooding.

3. Bluepoint-Kokan association

Nearly level to steep, somewhat excessively drained or excessively drained sandy and gravelly soils on dissected terraces and alluvial fans

This association is mainly on the nearly level to steep dissected terraces east and west of the Rio Grande and Rio Puerco Valleys. The native vegetation is mainly mid and short grasses, and broom snakeweed. Elevations range from about 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 165 to 185 days.

This association makes up 20 percent of the survey area. It is about 60 percent Bluepoint soils, 23 percent Kokan soils, and 17 percent Wink and Vinton soils, Rock outcrop, and Cut and fill land.

Bluepoint soils typically are pale brown loamy fine sand and loamy sand and light yellowish brown loamy sand. They formed in sandy alluvium partly modified by wind. These nearly level to rolling soils are mainly on broad [illegible] alluvial fans.

Kokan soils typically are very pale brown gravelly and very gravelly sand. They formed in old alluvial sand and gravel of mixed sources. These rolling to steep soils are on dissected terraces.

The soils in this association are used for range, wildlife habitat, watershed, and community development. Wildlife is mainly scaled quail and mourning dove. Kokan soils are a potential source of sand and gravel. The hazard of water erosion is moderate or severe. Seepage on this association is a major limitation. Local tracts are a source of Indian artifacts.

2. Bosque-Gila association

Level or nearly level, well drained loamy soils mainly on the flood plain along the Rio Puerco

This association is on the level or nearly level flood plains along the Rio Puerco and its tributaries. The major soils formed in alluvium derived primarily from shale. The native vegetation is mainly mid and short grasses and fourwing saltbush. Elevations range from about 5,000 to 5,600 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 55° to 58° F, and the frost-free season is 160 to 180 days.

This association makes up about 2 percent of the survey area. It is about 63 percent Bosque soils, 35 percent Gila soils, and 2 percent Bluepoint and Pinavetes soils on terraces and uplands.

Bosque soils typically have a surface layer of pale brown silty clay loam. This layer is underlain by light gray and light brownish gray silty clay. These soils are in swales and concave areas.

Gila soils typically have a surface layer of brown silty clay loam. This layer is underlain by stratified brown and light yellowish brown very fine sandy loam and sandy loam. These soils are in the slightly higher areas.

The soils in this association are used for range and wildlife habitat. Saline and alkali conditions are common.

Deep Soils on Alluvial Fans, Mesas, and Piedmonts

Soil associations 4, 5, and 6 are deep, level to moderately steep, well drained loamy and gravelly soils on the East and West Mesas. The soils formed in old unconsolidated, mixed sandy and gravelly alluvium. The native vegetation is shrubs and short, mid, and tall grasses. Elevations range from 4,800 to 6,300 feet.

4. Madurez-Wink association

Level to moderately sloping, well drained loamy soils on piedmonts

This association is on the level to moderately sloping East and West Mesas. The major soils formed in old unconsolidated alluvium modified by wind. The native vegetation is mainly mid and short grasses and shrubs. Elevations range from 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 170 to 185 days.

This association makes up 16 percent of the survey area. It is about 43 percent Madurez soils, 37 percent Wink soils, and 20 percent Pajarito, Latene, and Embudo soils and Cut and fill land.

Madurez soils typically have a surface layer of brown fine sandy loam, a subsoil of brown sandy clay loam and light brown fine sandy loam, and a substratum of pink, pinkish gray, and light brown sandy loam. They are in slightly concave upland areas.

Wink soils typically have a surface layer of brown fine sandy loam and sandy loam, a subsoil of light brown sandy loam, and a substratum of pinkish gray and pinkish white sandy loam that is high in lime content. They are in slightly convex upland areas.

The soils in this association are used for range, watershed, wildlife habitat, and community development. Wildlife is mainly scaled quail, mourning dove, and antelope. Several tracts have been subdivided.

5. *Tijeras-Embudo association*

Level to moderately sloping, well drained loamy and gravelly soils on alluvial fans

This association is on the level to moderately sloping western foot slopes of the Sandia and Manzano Mountains. The native vegetation is mainly mid and short grasses, cholla cactus, and small soapweed. Elevations range from 4,800 to 6,500 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 170 to 195 days.

This association makes up about 9 percent of the survey area. It is about 38 percent Tijeras soils, 30 percent Embudo soils, and 32 percent Tome, Tesajo, Millett, Wink, Madurez, and Bluepoint soils.

Tijeras soils typically have a surface layer of brown gravelly fine sandy loam, a subsoil of brown sandy clay loam, and a substratum of pale brown, calcareous very gravelly loamy sand and gravelly sandy loam. These nearly level to moderately sloping soils are mainly on the upper parts of old alluvial fans.

Embudo soils typically have a surface layer of brown gravelly fine sandy loam. This layer is underlain by brown and light brownish gray gravelly sandy loam and pale brown gravelly loamy coarse sand. These level to gently sloping soils are mainly in depressional areas or on the lower parts of alluvial fans.

The soils in this association are used for community development, range, and wildlife habitat. Several tracts have been subdivided.

6. *Latene-Nickel association*

Nearly level to moderately steep, well drained loamy and gravelly soils on mesas and fans

This association is on nearly level to moderately steep mesas and fans mainly in the south-central part of the survey area. The native vegetation is broom snakeweed and mid and short grasses. Elevations range from 5,000 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 170 to 195 days.

This association makes up about 1 percent of the survey area. It is about 65 percent Latene soils, 30 percent Nickel soils, and 5 percent Wink and Madurez soils.

Latene soils typically have a surface layer of brown sandy loam. This layer is underlain by pale brown sandy loam and white gravelly sandy loam. These nearly level to gently sloping soils are on mesas.

Nickel soils typically have a surface layer of brown gravelly fine sandy loam. This layer is underlain by light brown gravelly loam, pinkish gray very gravelly loam, light brown very gravelly loamy sand, and light brown very gravelly sandy loam. These moderately sloping to moderately steep soils are on fans.

The soils in this association are used for range, wildlife habitat, watershed, and community development.

Moderately Deep or Shallow Soils on Basalt Flows

Soil association 7 is shallow or moderately deep, well drained loamy and cobbly soils on the West Mesa. The soils formed in material overlying basalt bedrock. The native vegetation is shrubs and short and mid grasses. Elevations range from 5,000 to 6,000 feet.

7. *Alemeda-Akela association*

Level to gently rolling, well drained loamy and cobbly soils

This association is on level to gently rolling basalt flows west of the Rio Grande Valley. The native vegetation is mid and short grasses, shrubs, and annuals. Elevations range from 5,000 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is about 58° to 60° F, and the frost-free season is 170 to 195 days.

This association makes up about 2 percent of the survey area. It is about 55 percent Alemeda soils, 13 percent Akela soils, 17 percent Rock outcrop, and 15 percent Bluepoint, Wink, and Madurez soils.

Alemeda soils typically have a surface layer of light yellowish brown sandy loam, a subsoil of light yellowish brown loam and pale brown gravelly sandy loam, and a substratum of light gray very cobbly sandy loam underlain by basalt bedrock at a depth of 20 to 40 inches. They are level to undulating and are moderately deep.

Akela soils typically have a surface layer of pale brown cobbly sandy loam. This layer is underlain by light gray very gravelly sandy loam that extends to fractured basalt at a depth of about 10 to 20 inches. They are gently undulating to gently rolling and are shallow.

The soils in this association are used for recreation, community development, watershed, wildlife habitat, and range. The moderate or shallow depth to bedrock and the high content of basalt cobbles and stones severely limit engineering uses. Some areas provide a potential source of basalt stone or volcanic cinders.

Very Shallow to Deep Soils on Uplands

Soil associations 8, 9, 10, and 11 are very shallow to deep, well drained loamy soils that formed in material weathered from sandstone, shale, or limestone. These soils are on uplands. The native vegetation is mid grasses, shrubs, oneseed juniper, and pinyon pine. Elevations range from 5,400 to 8,000 feet.

8. *Penistaja-Travessilla-Bond association*

Deep to very shallow, nearly level to strongly sloping, well drained loamy soils over sandstone

This association is in nearly level to strongly sloping areas in the northwest part of the survey area. The native vegetation is mid and short grasses and oneseed juniper. Elevations range from 5,400 to 8,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is 50° to 54° F, and the frost-free season is 110 to 155 days.

This association makes up about 4 percent of the survey area. It is about 30 percent Penistaja soils; 28 percent Travessilla soils; 18 percent Bond soils; 15 percent Kim, Shingle, and Bluepoint soils and Badland; and 9 percent Rock outcrop.

Penistaja soils typically have a surface layer of brown fine sandy loam, a subsoil of strong brown and light brown sandy clay loam, and a substratum of light brown loamy fine sand that extends to a depth of 60 inches or more. They are nearly level to gently sloping and are deep to sandstone.

Travessilla soils typically have a surface layer of light yellowish brown fine sandy loam. This layer is underlain by pale brown sandy loam. Sandstone bedrock is at a depth of about 10 inches. Travessilla soils are nearly level to strongly sloping and are shallow or very shallow.

Bond soils typically have a surface layer of brown fine sandy loam and a subsoil of brown and strong brown sandy clay loam that is underlain by sandstone bedrock at a depth of about 18 inches. They are moderately sloping to strongly sloping and are shallow.

The soils in this association are used for range, wildlife habitat, and watershed. The shallow or very shallow depth to bedrock in Travessilla and Bond soils severely limits engineering uses.

2. Tijeras-Embudo association

Level to moderately sloping, well drained loamy and gravelly soils on alluvial fans

This association is on the level to moderately sloping western foot slopes of the Sandia and Manzano Mountains. The native vegetation is mainly mid and short grasses, cholla cactus, and small soapweed. Elevations range from 4,800 to 6,350 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F., and the frost-free season is 170 to 195 days.

This association makes up about 8 percent of the survey area. It is about 38 percent Tijeras soils, 30 percent Embudo soils, and 32 percent Tome, Tesajo, Millett, Wink, Madurez, and Bluepoint soils.

Tijeras soils typically have a surface layer of brown gravelly fine sandy loam, a subsoil of brown sandy clay loam, and a substratum of pale brown, calcareous very gravelly loamy sand and gravelly sandy loam. These nearly level to moderately sloping soils are mainly on the upper parts of old alluvial fans.

Embudo soils typically have a surface layer of brown gravelly fine sandy loam. This layer is underlain by brown and light brownish gray gravelly sandy loam and pale brown gravelly loamy coarse sand. These level to gently sloping soils are mainly in depressional areas or on the lower parts of alluvial fans.

The soils in this association are used for community development, range, and wildlife habitat. Several areas have been subdivided.

6. Latene-Nickel association

Nearly level to moderately steep, well drained loamy and gravelly soils on mesas and fans

This association is on nearly level to moderately steep mesas and fans mainly in the south-central part of the survey area. The native vegetation is broom snakeweed and mid and short grasses. Elevations range from 4,900 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 170 to 195 days.

This association makes up about 1 percent of the survey area. It is about 65 percent Latene soils, 30 percent Nickel soils, and 5 percent Wink and Madurez soils.

Latene soils typically have a surface layer of brown sandy loam. This layer is underlain by pale brown sandy loam and white gravelly sandy loam. These nearly level to gently sloping soils are on mesas.

Nickel soils typically have a surface layer of brown gravelly fine sandy loam. This layer is underlain by light brown gravelly loam, pinkish gray very gravelly loam, light brown very gravelly loamy sand, and light brown very gravelly sandy loam. These moderately sloping to moderately steep soils are on fans.

The soils in this association are used for range, wildlife habitat, watershed, and community development.

Moderately Deep or Shallow Soils on Basalt Flows

Soil association 7 is shallow or moderately deep, well drained loamy and cobbly soils on the West Mesa. The soils formed in material overlying basalt bedrock. The native vegetation is shrubs and short and mid grasses. Elevations range from 5,000 to 6,000 feet.

7. Alemeda-Akela association

Level to gently rolling, well drained loamy and cobbly soils

This association is on level to gently rolling basalt flows west of the Rio Grande Valley. The native vegetation is mid and short grasses, shrubs, and annuals. Elevations range from 5,000 to 6,000 feet. The mean annual precipitation is 7 to 10 inches, the mean annual air temperature is about 56° to 60° F., and the frost-free season is 170 to 185 days.

This association makes up about 2 percent of the survey area. It is about 50 percent Alemeda soils, 13 percent Akela soils, 17 percent Rock outcrop, and 18 percent Bluepoint, Wink, and Madurez soils.

Alemeda soils typically have a surface layer of light yellowish brown sandy loam, a subsoil of light yellowish brown loam and pale brown gravelly sandy loam, and a substratum of light gray very cobbly sandy loam underlain by basalt bedrock at a depth of 20 to 40 inches. They are level to undulating and are moderately deep.

Akela soils typically have a surface layer of pale brown cobbly sandy loam. This layer is underlain by light gray very gravelly sandy loam that extends to fractured basalt at a depth of about 10 to 20 inches. They are gently undulating to gently rolling and are shallow.

The soils in this association are used for recreation, community development, watershed, wildlife habitat, and range. The moderate or shallow depth to bedrock and the high content of basalt cobbles and stones severely limit engineering uses. Some areas provide a potential source of basalt stone or volcanic cinders.

Very Shallow to Deep Soils on Uplands

Soil associations 8, 9, 10, and 11 are very shallow to deep, well drained loamy soils that formed in material weathered from sandstone, shale, or limestone. These soils are on uplands. The native vegetation is mid grasses, shrubs, oneseed juniper, and pinyon pine. Elevations range from 5,400 to 8,000 feet.

8. Penistaja-Travessilla-Bond association

Deep to very shallow, nearly level to strongly sloping, well drained loamy soils over sandstone

This association is in nearly level to strongly sloping areas in the northwest part of the survey area. The native vegetation is mid and short grasses and oneseed juniper. Elevations range from 6,400 to 7,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 52° to 54° F, and the frost-free season is 150 to 165 days.

This association makes up about 4 percent of the survey area. It is about 30 percent Penistaja soils; 22 percent Travessilla soils; 14 percent Bond soils; 15 percent Kim, Shingle, and Bluepoint soils and Badland; and 9 percent Rock outcrop.

Penistaja soils typically have a surface layer of brown fine sandy loam, a subsoil of strong brown and light brown sandy clay loam, and a substratum of light brown loamy fine sand that extends to a depth of 60 inches or more. They are nearly level to gently sloping and are deep to sandstone.

Travessilla soils typically have a surface layer of light yellowish brown fine sandy loam. This layer is underlain by pale brown sandy loam. Sandstone bedrock is at a depth of about 10 inches. Travessilla soils are nearly level to strongly sloping and are shallow or very shallow.

Bond soils typically have a surface layer of brown fine sandy loam and a subsoil of brown and strong brown sandy clay loam that is underlain by sandstone bedrock at a depth of about 15 inches. They are moderately sloping to strongly sloping and are shallow.

The soils in this association are used for range, wildlife habitat, and watershed. The shallow or very shallow depth to bedrock in Travessilla and Bond soils severely limits engineering uses.

9. *Penistaja-Otero association*

Deep, nearly level to moderately sloping, well drained loamy soils underlain in places by sandstone

This association is on nearly level to moderately sloping uplands in the western part of the survey area. The major soils formed in aeolian deposits underlain by sandstone and in old alluvium derived from sandstone on upland alluvial fans. The native vegetation is mid and short grasses. Elevations range from 5,400 to 7,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 52° to 55° F, and the frost-free season is 120 to 155 days.

This association makes up about 5 percent of the survey area. It is 65 percent Penistaja soils, 12 percent Otero soils, and 23 percent Travessilla and Silver soils, Badland, and Rock outcrop.

Penistaja soils typically have a surface layer of brown fine sandy loam, a subsoil of strong brown and light brown sandy clay loam, and a substratum of light brown loamy fine sand underlain by sandstone. They are nearly level to gently sloping.

Otero soils typically have a surface layer of yellowish brown fine sandy loam and a substratum of yellowish brown and brown fine sandy loam and loamy fine sand. These nearly level to moderately sloping soils are on alluvial fans.

The soils in this association are used mainly for range, wildlife habitat, and watershed.

10. *Shingle-Kim association*

Deep to very shallow, level to gently rolling, well drained loamy soils over shale and sandstone

This association is on level to gently rolling, broad, moderately incised valleys and associated uplands in the western part of the survey area. The major soils formed in residuum derived from soft shale and in alluvium weathered from interbedded shale and sandstone. The native vegetation is mid and short grasses. Elevations range from about 5,500 to 6,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 53° to 55° F, and the frost-free season is 120 to 155 days.

This association makes up 3 percent of the survey area. It is about 50 percent Shingle soils, 25 percent Kim soils, and 25 percent Badland, Rock outcrop, and Penistaja and Hantz soils.

Shingle soils typically have a surface layer of light olive brown clay loam. This layer is underlain by light brownish gray silty clay loam. Shale and soft siltstone bedrock is at a depth of about 15 inches. These soils are shallow or very shallow over soft shale and are in convex areas.

Kim soils typically have a surface layer of light olive brown sandy loam. This layer is underlain to a depth of 60 inches or more by light yellowish brown loam. These soils are deep over interbedded shale and sandstone and are in concave areas.

The soils in this association are used for range, wildlife habitat, and watershed.

11. *Silver-Witt-Laporte association*

Deep to very shallow, level to moderately steep, well drained loamy soils underlain in places by limestone

This association is on level to moderately steep uplands in the eastern part of the survey area. The major soils formed in old alluvium, in sediments derived from mixed parent material, and in residuum weathered from limestone bedrock. The native vegetation is mid and short grasses, pinyon pine, and oneseed juniper. Elevations range from 6,400 to 7,500 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is 47° to 55° F, and the frost-free season is 110 to 115 days.

This association makes up 10 percent of the survey area. It is 30 percent Silver soils, 24 percent Witt soils, 20 percent Laporte soils, and 26 percent Rock outcrop, Manzano soils, and Borolls.

Silver soils typically have a surface layer of brown very fine sandy loam, a subsoil of brown and light brown heavy silty clay loam and brown heavy silt loam, and a substratum of light brown heavy silt loam. They are deep and level to strongly sloping.

Witt soils typically have a surface layer of dark yellowish brown very fine sandy loam, a subsoil of reddish brown silty clay loam, and a substratum of pinkish white light silty clay loam. They are deep and nearly level to moderately sloping.

Laporte soils typically have a surface layer of dark grayish brown loam. This layer is underlain by grayish brown loam that extends to limestone bedrock at a depth of about 14 inches. These soils are shallow or very shallow and are moderately sloping to moderately steep.

The soils in this association are used for range, wildlife habitat, watershed, and community development.

Shallow To Deep Soils on Mountains and Foot Slopes

Soil associations 12 and 13 are shallow to deep, well drained, very cobbly, stony, very stony, and loamy soils on mountains and footslopes. The soils formed in residuum. The native vegetation is mid grasses, shrubs, oneseed juniper, pinyon pine, ponderosa pine, Douglas-fir, and white fir. Elevations range from 6,000 to 10,500 feet.

12. *Seis-Orthids association*

Shallow or moderately deep, level to very steep, well drained, very cobbly, stony, and very stony loamy soils

This association is in level to very steep areas in the eastern part of the survey area. The native vegetation is pinyon pine, oneseed juniper, Gambel oak, mountain-mahogany, skunkbush sumac, and mid and short grasses. Elevations range from 6,000 to 8,000 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 43° to 55° F, and the frost-free season is 110 to 160 days.

This association makes up 12 percent of the survey area. It is about 28 percent Seis soils, 12 percent Orthids, and 60 percent Salas, Silver, La Fonda, Carlito, Millett, Tesajo, Bond, Scholle, Burnac, and Ildefonso soils and Ustolls, Rock outcrop, and Badland.

Seis soils typically are pinkish gray very cobbly loam and very stony clay loam underlain by limestone bedrock at a depth of about 30 inches. They are moderately deep, level to steep soils that formed in residuum weathered from limestone on the sides of mountains.

Orthids typically have a surface layer of light brown, pale brown, or brown stony or very stony loam. This layer is underlain by reddish brown, brown, or strong brown very gravelly loam or very stony sandy loam that extends to bedrock at a depth of 10 to 30 inches. These soils are shallow to moderately deep and steep or very steep. They formed in residuum weathered from granite, gneiss, schist, limestone, and sandstone on sides of canyons and mountains.

The soils in this association are used for range, wildlife habitat, watershed, and recreation.

9. *Penistaja-Otero association*

Deep, nearly level to moderately sloping, well drained loamy soils underlain in places by sandstone

This association is on nearly level to moderately sloping uplands in the western part of the survey area. The major soils formed in eolian deposits underlain by sandstone and in old alluvium derived from sandstone on upland alluvial fans. The native vegetation is mid and short grasses. Elevations range from 5,400 to 7,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 52° to 55° F, and the frost-free season is 120 to 155 days.

This association makes up about 6 percent of the survey area. It is 65 percent Penistaja soils, 12 percent Otero soils, and 23 percent Travessilla and Silver soils, Badland, and Rock outcrop.

Penistaja soils typically have a surface layer of brown fine sandy loam, a subsoil of strong brown and light brown sandy clay loam, and a substratum of light brown loamy fine sand underlain by sandstone. They are nearly level to gently sloping.

Otero soils typically have a surface layer of yellowish brown fine sandy loam and a substratum of yellowish brown and brown fine sandy loam and loamy fine sand. These nearly level to moderately sloping soils are on alluvial fans.

The soils in this association are used mainly for range, wildlife habitat, and watershed.

10. *Shingle-Kim association*

Deep to very shallow, level to gently rolling, well drained loamy soils over shale and sandstone

This association is on level to gently rolling, broad, moderately incised valleys and associated uplands in the western part of the survey area. The major soils formed in residuum derived from soft shale and in alluvium weathered from interbedded shale and sandstone. The native vegetation is mid and short grasses. Elevations range from about 5,500 to 6,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 53° to 55° F, and the frost-free season is 120 to 155 days.

This association makes up 5 percent of the survey area. It is about 50 percent Shingle soils, 25 percent Kim soils, and 25 percent Badland, Rock outcrop, and Penistaja and [illegible] soils.

Shingle soils typically have a surface layer of light olive brown clay loam. This layer is underlain by light brownish gray silty clay loam. Shale and soft siltstone bedrock is at a depth of about 15 inches. These soils are shallow or very shallow over soft shale and are in convex areas.

Kim soils typically have a surface layer of light olive brown sandy loam. This layer is underlain to a depth of 60 inches or more by light yellowish brown loam. These soils are deep over interbedded shale and sandstone and are in concave areas.

The soils in this association are used for range, wildlife habitat, and watershed.

11. *Silver-Witt-Laporte association*

Deep to very shallow, level to moderately steep, well drained loamy soils underlain in places by limestone

This association is on level to moderately steep uplands in the eastern part of the survey area. The major soils formed in old alluvium, in sediments derived from mixed parent material, and in residuum weathered from limestone bedrock. The native vegetation is mid and short grasses, pinyon pine, and oneseed juniper. Elevations range from 6,400 to 7,500 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is 47° to 52° F, and the frost-free season is 110 to 115 days.

This association makes up 10 percent of the survey area. It is 30 percent Silver soils, 24 percent Witt soils, 23 percent Laporte soils, and 23 percent Rock outcrop, Manzano soils, and [illegible].

Silver soils typically have a surface layer of brown very fine sandy loam, a subsoil of brown and light brown heavy silty clay loam and brown heavy silt loam, and a substratum of light brown heavy silt loam. They are deep and level to strongly sloping.

Witt soils typically have a surface layer of dark yellowish brown very fine sandy loam, a subsoil of reddish brown silty clay loam, and a substratum of pinkish white light silty clay loam. They are deep and nearly level to moderately sloping.

Laporte soils typically have a surface layer of dark grayish brown loam. This layer is underlain by grayish brown loam that extends to limestone bedrock at a depth of about 14 inches. These soils are shallow or very shallow and are moderately sloping to moderately steep.

The soils in this association are used for range, wildlife habitat, watershed, and community development.

Shallow To Deep Soils on Mountains and Foot Slopes

Soil associations 12 and 13 are shallow to deep, well drained, very cobbly, stony, very stony, and loamy soils on mountains and footslopes. The soils formed in residuum. The native vegetation is mid grasses, shrubs, oneseed juniper, pinyon pine, ponderosa pine, Douglas-fir, and white fir. Elevations range from 6,000 to 10,000 feet.

12. *Sedo-Orthids association*

Shallow or moderately deep, level to very steep, well drained, very cobbly, stony, and very stony loamy soils

This association is in level to very steep areas in the eastern part of the survey area. The native vegetation is pinyon pine, oneseed juniper, Gambel oak, mountain mahogany, skunkbush sumac, and mid and short grasses. Elevations range from 6,000 to 9,000 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 45° to 50° F, and the frost-free season is 120 to 160 days.

This association makes up 12 percent of the survey area. It is about 25 percent Sedo soils, 12 percent Orthids, and 63 percent [illegible] soils and Ustolls, Rock outcrop, and Badland.

Sedo soils typically are grayish gray very cobbly loam and very stony clay loam underlain by limestone bedrock at a depth of about 20 inches. They are moderately deep, level to steep soils that formed in residuum weathered from limestone on the sides of mountains.

Orthids typically have a surface layer of light brown, pale brown, or brown stony or very stony loam. This layer is underlain by reddish brown, brown, or strong brown very gravelly loam or very stony sandy loam that extends to bedrock at a depth of 10 to 30 inches. These soils are shallow to moderately deep and steep or very steep. They formed in residuum weathered from granite, gneiss, schist, limestone, and sandstone on sides of canyons and mountains.

The soils in this association are used for range, wildlife habitat, watershed, and recreation.

13. *Kolob-Rock outcrop association*

Deep, moderately steep to very steep, well drained loamy and stony soils and Rock outcrop

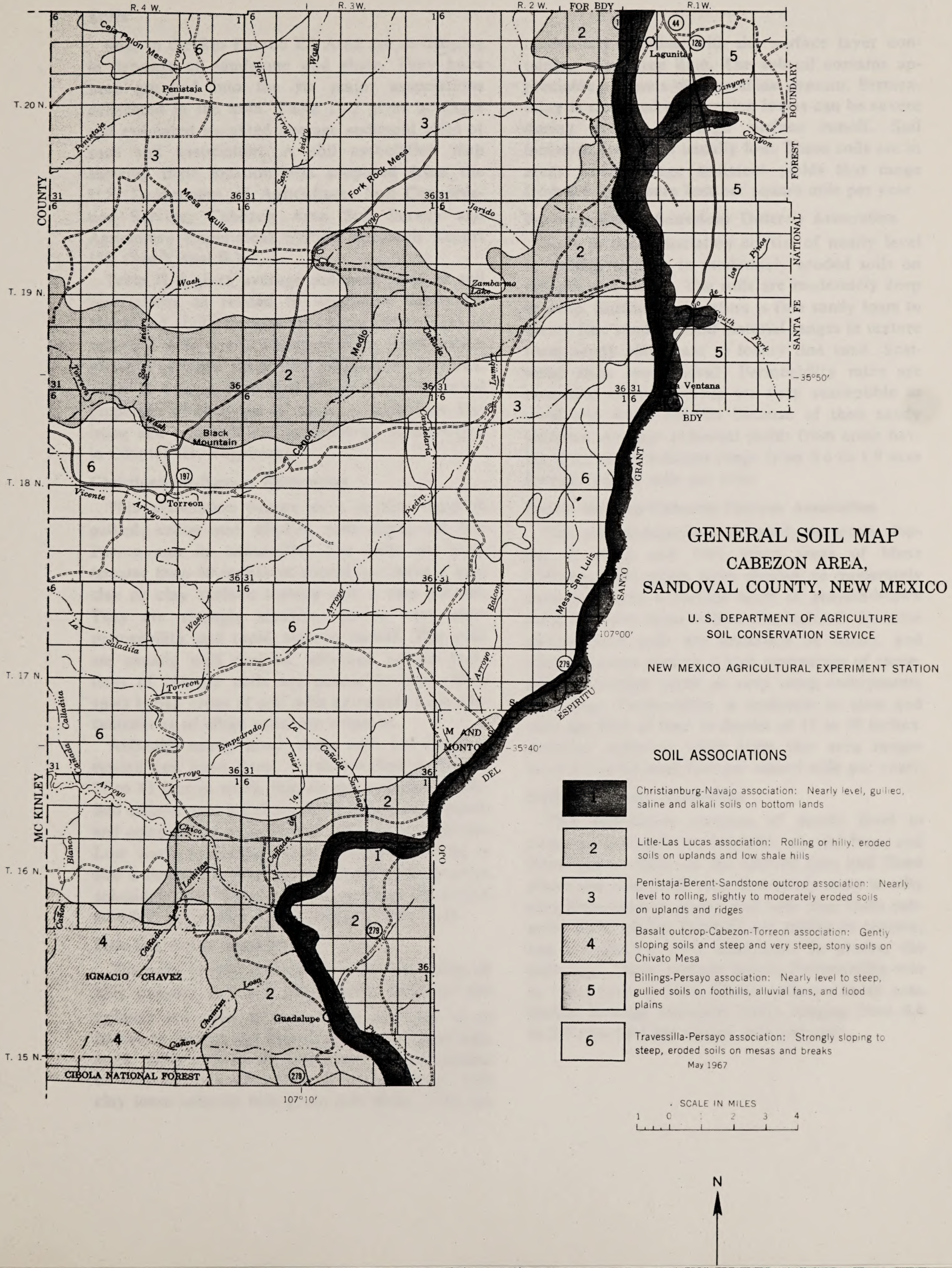
This association is on moderately steep to very steep mountains in the eastern part of the survey area. The native vegetation is ponderosa pine, Douglas-fir, Gambel oak, mountainmahogany, bottlebrush squirreltail, and junegrass. Elevations range from 8,400 to 10,500 feet. The mean annual air temperature is 43° to 45° F, and the frost-free season is 60 to 100 days.

This association makes up 8 percent of the survey area. It is about 28 percent Kolob soils, 24 percent Rock outcrop, and 48 percent Pino, Laporte, and Sandia soils, Borolls, and the Kolob variant.

Kolob soils typically have a surface layer of dark grayish brown stony loam and stony clay loam and a subsoil of brown stony clay and very stony clay. Limestone bedrock is at a depth of about 42 inches.

Rock outcrop is on the mesa breaks, canyon walls, and sides of ridges where resistant limestone, schist, gneiss, sandstone, or granite has been exposed through faulting, uplifting, or geologic erosion.

The soils in this association are used for wildlife habitat, watershed, recreation, timber, and range.


R. 4 W.
R. 3W.
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FOR BDY
R.1W.
T. 20 N.
T. 19 N.
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T. 17 N.
T. 16 N.
T. 15 N.
COUNTY
MC KINLEY
Ceja Pelon Mesa
Penistaja
Penistaje
Horn
Arroyo
Wash
San Isidro
Fork Rock Mesa
Mesa Aguila
Jarido
Zambarano Lake
Wash
San Isidro
Torreon
Medio
Cañada
Lumbre
Black Mountain
Cench
Candelaria
Vicente
Arroyo
Torreon
Piedra
197
Lagunitas
44
126
Canyon
FOREST
BOUNDARY
NATIONAL
SANTA FE
los Pinos
South Fork
La Ventana
BDY
GRANT
Mesa San Luis
SANTO
ESPIRITU
DEL
OJO
MONTOYA
M AND
279
La Saladita
Wash
Arroyo
Balcon
Torreon
Empedrado
La Cañada
Leña
Cañadita
Cañada
Arroyo
Chico
Blanco
Cañada de la Santiago
Lomitas
Cañon
IGNACIO CHAVEZ
Losa
Chamiso
Cañon
Guadalupe
CIBOLA NATIONAL FOREST
-35°50′
107°00′
-35°40′
107°10′
1
2
3
4
5
6
SCALE IN MILES
1 0 1 2 3 4
N

GENERAL SOIL MAP
CABEZON AREA, SANDOVAL COUNTY, NEW MEXICO

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NEW MEXICO AGRICULTURAL EXPERIMENT STATION

SOIL ASSOCIATIONS

1	Christianburg-Navajo association: Nearly level, gullied, saline and alkali soils on bottom lands
2	Litle-Las Lucas association: Rolling or hilly, eroded soils on uplands and low shale hills
3	Penistaja-Berent-Sandstone outcrop association: Nearly level to rolling, slightly to moderately eroded soils on uplands and ridges
4	Basalt outcrop-Cabezon-Torreon association: Gently sloping soils and steep and very steep, stony soils on Chivato Mesa
5	Billings-Persayo association: Nearly level to steep, gullied soils on foothills, alluvial fans, and flood plains
6	Travessilla-Persayo association: Strongly sloping to steep, eroded soils on mesas and breaks

May 1967

Soils

Soils in the Rio Puerco ES Area are developing in deposits of sandstone and shale. They have been grouped into the six major associations delineated in the area. Table II-2 gives acreages and estimated weighted average sediment yield of each soil association. A soil association map showing their location was prepared from the U.S. Department of Agriculture, Soil Conservation Service, Cabezon Area Soil Survey and Agriculture Experiment Station Research Report 188. (See Visual B.)

Table II-3 gives average sediment yield of soil associations as related to vegetative sub-types. North and south designations show differences in sediment yield due to variation in the precipitation patterns between these two portions of the area. Table II-4 gives estimated physical and chemical properties of each soil in the six associations. Existing and potential soil productivity is discussed in Chapter III, Vegetation.

Christianburg-Navajo Association

This association occurs as a narrow band of gullied, saline and alkaline soils along the Rio Puerco and its tributaries. The soils are deep (greater than 40 inches in depth) and have a silty clay or clay surface texture and a clay subsoil. They are strongly alkaline, having very slow permeability and rapid surface runoff. The soils are usually well drained, although certain locations of Navajo soils are poorly drained. Slick spots (small areas of soil with extremely high concentrations of alkali salts) are common.

Although nearly level, these soils are severely eroded and have deep, vertical-walled gullies of 20 to 40 feet in width that slough and pipe easily. Soil salinity and alkalinity limit vegetative growth and composition to primarily salt-tolerant species. Low water availability (soil moisture content) is also a limitation. Average sediment yield in areas containing this association range from 0.8 to 2.5 acre feet per square mile per year (Table II-3).

Litle-Las Lucas Association

The soils of this association occur on rolling or hilly uplands and low shale hills. Soils on the uplands are deep to moderately deep (30 to 40 inches in depth) and have clay or clay loam subsoils, while soils on the low shale hills are shallow to very shallow (less than 20 inches deep) with clay loam subsoils that grade into shale. Soils are moderately alkaline with the surface layer containing some free lime. The subsoil contains appreciable amounts of crystalline gypsum. Permeability is slow and soil erosion losses can be severe during periods of high surface runoff. Soil moisture content is usually low. These soils are in areas with average sediment yields that range from 0.6 to 2.6 acre feet per square mile per year.

Penistaja-Berent-Sandstone Outcrop Association

Soils in this association consist of nearly level to rolling, slightly to moderately eroded soils on uplands and ridges. The soils are moderately deep to deep. Surface soil texture is fine sandy loam to loamy fine sand; subsoil material ranges in texture from sandy clay loam to loamy fine sand. Scattered slick spots occur. Permeability rates are moderate to rapid. Soils are very susceptible to wind and water erosion because of their sandy textures. Average sediment yields from areas having this soil association range from 0.4 to 1.9 acre feet per square mile per year.

Basalt Outcrop-Cabezon-Torreon Association

This soil association is primarily on gently sloping to steep and very steep areas of Mesa Chivato. Soils range from shallow to moderately deep and have a surface layer of grayish-brown loam or stony loam with a clay subsoil. In some places these soils are underlain by basalt, and their substrata contain a high percentage of stone. Basalt outcrops occur as very steep escarpments and plugs. Permeability is moderate to slow and soils are free of lime to depths of 15 to 30 inches. Average sediment yield from this area ranges from 0.2 to 0.4 acre feet per square mile per year.

Billings-Persayo Association

This association consists of nearly level to steep, gullied soils on foothills, alluvial fans, and flood plains. Soils on the alluvial fans and flood plains are deep with very fine sandy loam to silty clay loam surface layers and silty clay loam subsoils. Soils on the foothills are similar in texture, but are shallow over sandstone. In places, the soils have stony surface layers. Permeability rate in these soils is slow. These soils are in an area having average sediment yields ranging from 0.8 to 2.5 acre feet per square mile per year.

Travessilla-Persayo Assocation

This soil association occurs on strongly sloping to steep mesas and breaks. These soils are shallow, with surface soil texture ranging from sandy loam to silty clay loam. The subsoil texture ranges from silty clay loam to sandy clay loam that grades into sandstone and shale. The soils are mildly alkaline, with free lime present to the surface. The association is dissected by many intermittent drainages, and rock outcrops and escarpments are common. Average sediment yield in this area ranges from 0.5 to 2.1 acre feet per square mile per year.

Erosion Condition

Present erosion condition classes within the soil associations have been developed based on soil surface factors obtained from vegetative transect data (see Map II-2).

The most common naturally occurring soil problems include wind and water erosion hazards due to parent material characteristics, low available soil moisture and soil textures with high sand or clay content. Clayey textured soils have high shrink-swell potentials, slow infiltration rates, and reduced plant-available soil moisture. Many of the soils and parent materials are saline and/or alkaline, and not conducive to plant growth.

Runoff and Sedimentation

Several data sources provide runoff rates and sedimentation for locations representative of the ES Area. Differences in these rates result from soil variability, location of recording devices, method of analysis and length of record.

A cooperative study of the upper Rio Grande by USDA and the New Mexico State Engineer found sediment yields of 1.0 to 3.0 acre feet per square mile per year for most of the area (USDA, SCS, FS, ERS, 1974). Forest Service studies of the San Luis Watershed in New Mexico from 1951-1959 indicate a value of 0.7 acre foot per square mile per year for that area (Aldon 1973 and Keyes 1976). Geologic Survey studies of Cornfield Wash indicate annual sedimentation values of about 1.9 acre feet per square mile per year for the period 1951-1960 (Burkham, 1966). Corp of Engineers reports on U.S. Geologic Survey stream gauges provide values of 0.7, 1.6 and 1.08 acre feet per square mile per year at Bernardo, Cabezon and Chico_Arroyo respectively (Corp of Engineers, June 1972). The Bernardo gauge period of record is 1939 to 1966. Records from the other two gauges cover nine years ending in 1956. Suspended sediment values, however, give a misleading picture of sediment yield from study areas. This is because channels originate outside the area and just pass through. In many cases, measurements were made off the ES Area. In an analysis using the Pacific Southwest Inter-Agency Committee (PSIAC) method, calibration was made using the San Luis and Cornfield Wash studies where range and sediment transects were available. These studies were direct measurements of sediment production from the respective areas, and reflect a more realistic picture of what may be happening.

Estimates calculated by the PSIAC method are approximations of the actual sedimentation yield values. The figures show order of magnitude and the relative differences between vegetative subtypes and soil associations (Table II-3).

Steep and rocky and barren vegetative subtypes on soils were not analyzed because of their limited occurrence and the fact that new management practices would not produce appreciable sediment yield changes. Erosion by soil blowing is evident in the area, but cannot be quantified at present.

The use of soils for selected construction and development purposes is subject to certain limitations caused by the physical or chemical properties of a soil. Supplementary Reference II-1 in the Albuquerque District Office (Interpretations of Soil Properties for Engineering Uses) provides information relative to engineering applications for soils in the area.

ESTIMATED PHYSICAL AND CHEMICAL PROPERTIES OF SOIL ASSOCIATIONS
RIO PUERCO ES AREA

Series Name	Depth To Bedrock (in)	Depth From Bedrock (in)	USDA Texture	Permeability (in. per hr.)	Available Water Holding Capacity (in. per in. soil)	Reaction pH	Salinity	Dispersion	Shrink-Swell Potential
Basalt Outcrop	-	-	-	-	-	-	-	-	-
Berent	36-60	0-9	Loamy Fine Sand	2.5 - 7.5	0.10	7.1 - 7.3	Slight	Moderate	Moderate
		9-18	Loamy Sand	2.5 - 7.5	0.10	7.9 - 8.4	Slight	Moderate	Moderate
		18-60	Loamy Sand	2.5 - 7.5	0.10	8.5 - 9.0	Slight	Moderate	Moderate
Billings	72	0-4	Silty Clay Loam	0.50-2.50	0.17	8.0 - 8.4	Slight	Moderate	Moderate
		4-27	Clay Loam	0.05-0.50	0.17	8.2 - 8.6	Slight	Low	High
		27-45	Silty Clay Loam	0.05-0.50	0.17	8.4 - 8.8	Slight	Low	High
Cabezon	8-16	0-3	Stony Loam	0.50-2.50	0.09	6.6 - 7.3	Non-Saline	Low	Moderate
		3-12	Clay	0.50-2.50	0.17	6.6 - 7.3	Non-Saline	Low	High
		12	Basalt-Bedrock	-	-	-	-	-	-
Christianburg	72	0-60	Clay	0.00-0.05	0.17	8-5 - 9.0	Moderate	Low	High
Las Lucas	6-72	0-4	Clay	0.80-2.50	0.17	7.9 - 8.4	Slight	Moderate	Moderate
		4-23	Clay Loam	0.80-2.50	0.17	7.9 - 8.4	Slight	Moderate	High
		23-60	Light Clay	0.80-2.50	0.17	7.9 - 8.4	Slight	Moderate	High
Litle	14-24	0-5	Silty Clay	0.05-0.50	0.17	7.9 - 8.4	Slight	Low	High
		5-20	Silty Clay	0.05-0.50	0.17	8.5 - 9.0	Slight	Low	High
Navajo	72	0-6	Clay	0.00-0.05	0.18	8.5 - 9.0	Slight	Moderate	High
		6-31	Clay	0.00-0.05	0.18	8.5 - 9.0	Severe	Moderate	High
Penistaja	72	0-6	Fine Sandy Loam	2.50-7.50	0.13	7.9 - 8.4	Slight	Moderate	Low
		6-21	Sandy Clay Loam	0.50-2.50	0.17	7.9 - 8.4	Slight	Moderate	Moderate
		21-45	Sandy Loam	2.50-7.50	0.13	7.0 - 8.4	Slight	High	Low
		45	Sandy Loam	-	-	-	-	-	-
Persayo	0-16	0-6	Silty Clay Loam	0.50-2.50	0.17	7.9 - 8.4	Slight	Low	Moderate
		6-14	Silty Clay Loam	0.00-0.05	0.17	7.9 - 8.4	Slight	Low	High
Sandstone Outcrop	-	-	-	-	-	-	-	-	-
Torreon	>60	0-13	Loam	0.50-2.50	0.17	6.6 - 7.3	Non-Saline	Low	Moderate
		13-38	Clay	0.05-0.20	0.17	6.6 - 7.3	Non-Saline	Low	High
		38-60	Clay Loam	0.50-2.50	0.17	6.6 - 7.3	Non-Saline	Low	Moderate
Travessilla	6-16	0-8	Fine Sandy Loam	2.50-7.50	0.18	7.9 - 8.4	Slight	Moderate	Low
		8	Sandstone						

No estimate of properties was made for Basalt Outcrop-Sandstone Outcrop. These land types are not mapped separately but are a part of other mapping units such as Cabezon, Berent, Billings, etc.

Source: Soil Conservation Service; Cabezon Soil Survey, 1971

AVERAGE SEDIMENT YIELD FROM DIFFERENT SOIL ASSOCIATIONS AND VEGETATIVE SUB-TYPES

ACRE FOOT/SQUARE MILE/YEAR

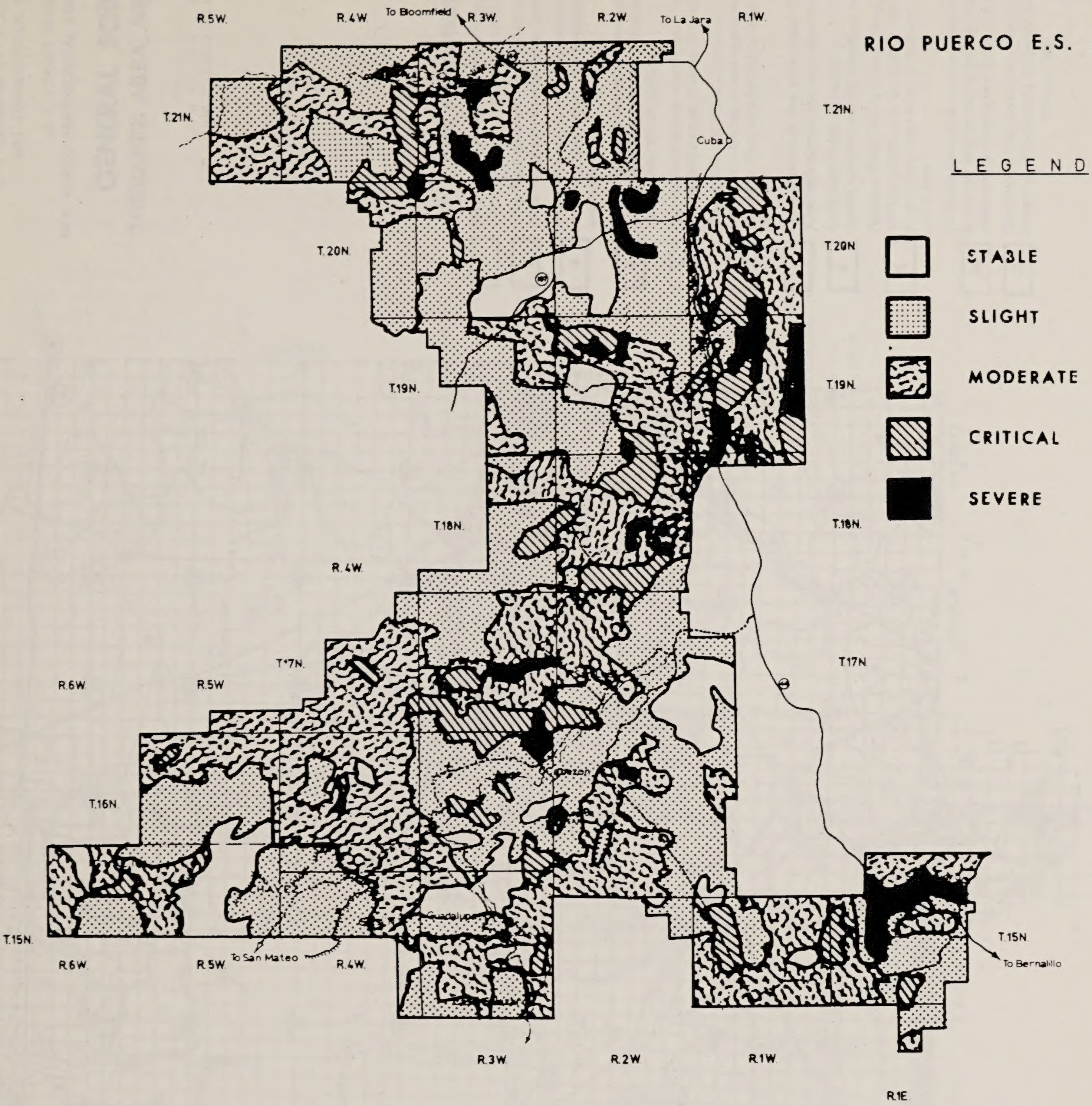
		Shortgrass	Ponderosa Pine	Four-wing Saltbush	Greasewood	Big Sagebrush	Pinyon-Juniper	Steep and Rocky	Barren	Broom Snakeweed
Christianburg-Navajo	Entire Area	0.8	-	0.8	0.9	-	-	-	2.5	-
Litle-Las Lucas	North	0.6	0.7	-	-	0.6	0.6	0.7	-	-
	South	0.7	-	0.7	0.7	-	0.7	0.6	2.6	0.7
Penistaja-Berent-Sandstone Outcrop	North Only	0.4	0.5	-	-	0.4	0.4	0.5	1.9	-
Basalt Outcrop-Cabezon	South Only	0.4	0.3	-	-	-	0.3	0.2	-	-
Billings-Persayo	North	1.0	0.9	-	-	0.9	0.8	0.9	-	-
	South	0.9	-	0.9	-	-	0.8	0.9	2.5	0.9
Travessilla-Persayo	North	-	0.6	-	-	0.6	0.6	0.6	-	-
	South	0.7	-	0.6	0.7	0.7	0.6	0.5	2.1	0.6

Source: Estimated by BLM Staff Specialist utilizing methods from Soil Conservation Service, U.S. Geological Survey and U.S. Forest Service.

ESTIMATED WEIGHTED AVERAGE SEDIMENT YIELD BY SOIL ASSOCIATIONS WITHIN THE RIO PUERCO ES AREA

Soil Number[a]	Soil Associations (% Slopes)	Acres	Square Miles	Present Yield		
				Acre-feet Square Mile per Year	Acre Feet per Year	Tons Square Mile per Year
1	Christianburg-Navajo (0-3%)	32,265	50.4	0.9	45	1,530
2	Litle-Las Lucas (1-15%)	94,030	146.9	0.7	103	1,170
3	Penistaja-Berent-Sandstone (0-60%)	88,675	138.6	0.5	69	810
4	Basalt Outcrop-Cabezon-Torreon (9-75%)	31,495	49.2	0.4	20	630
5	Billings-Persayo (1-25%)	93,355	145.9	0.9	131	1,620
6	Travessilla-Persayo (3-25%)	172,096	268.9	0.7	188	1,170
		511,916				

PRESENT EROSION CONDITIONS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R.4W.
To Bloomfield
R.3W.
R.2W.
To La Jara
R.1W.
T.21N.
T.21N.
Cuba
T.20N.
T.20N
T.19N.
T.19N.
T.18N.
T.18N.
R.4W.
T.17N.
T.17N.
R.6W.
R.5W
T.16N.
Guadalupe
T.15N.
T.15N.
R.6W.
R.5W.
To San Mateo
R.4W.
To Bernalillo
R.3W.
R.2W.
R.1W.
R.1E.

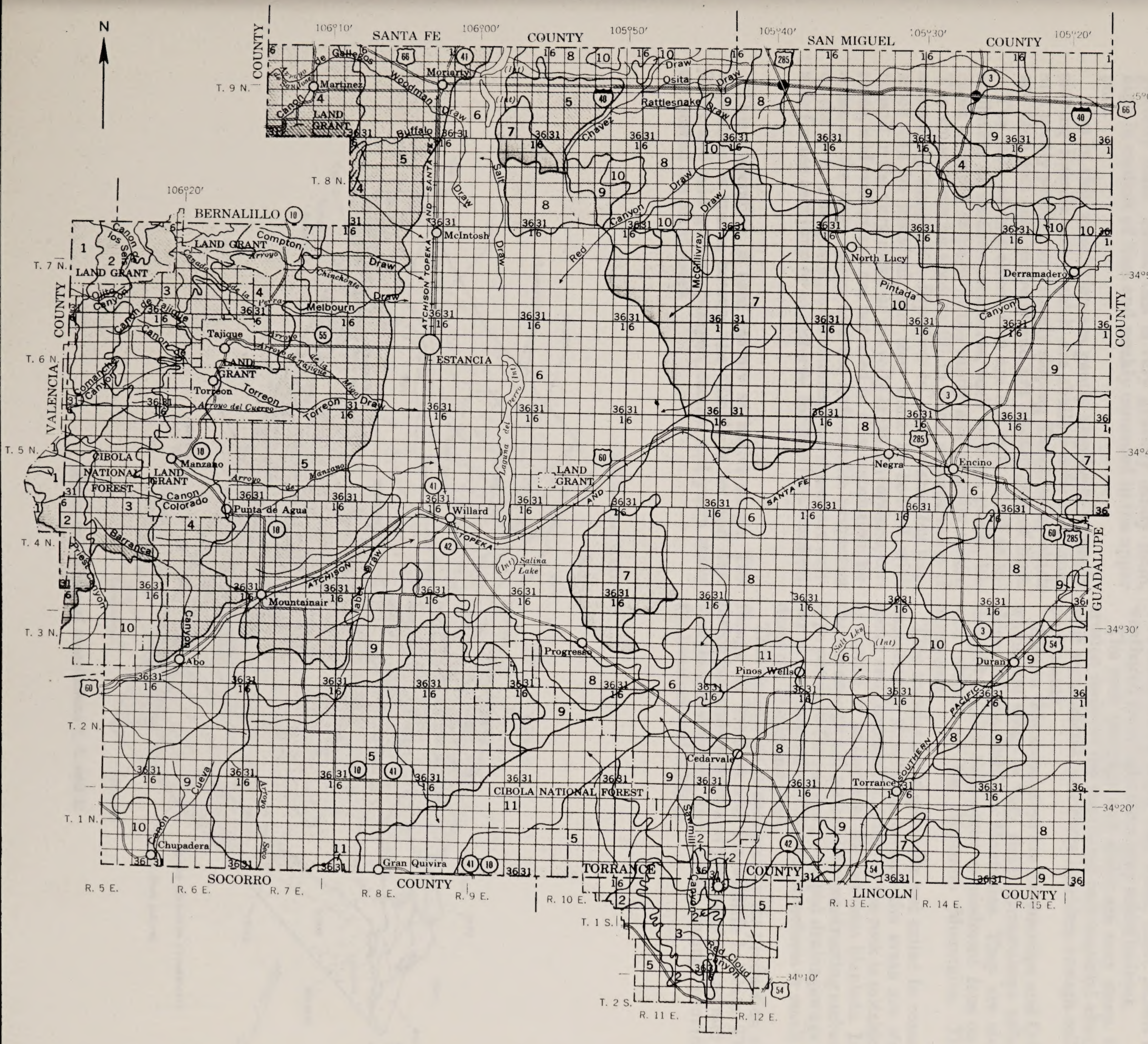
RIO PUERCO E.S. AREA

LEGEND

		ACRES
☐	STABLE	34,706
░	SLIGHT	187,187
▒	MODERATE	229,767
▨	CRITICAL	34,254
■	SEVERE	6,149

SOURCE: 1975 RESOURCE INVENTORY

MAP II-2


N
SANTA FE
COUNTY
SAN MIGUEL
COUNTY
GUADALUPE
COUNTY
LINCOLN
COUNTY
TORRANCE
COUNTY
SOCORRO
COUNTY
VALENCIA
COUNTY
BERNALILLO
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106°00′
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105°20′
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R. 11 E.
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
Martinez
Moriarty
McIntosh
ESTANCIA
Willard
Mountainair
Abo
Chupadera
Gran Quivira
Progresso
Pinos Wells
Cedarvale
Torrance
Duran
Encino
Negra
North Lucy
Derramadero
Tajique
Torreon
Manzano
Punta de Agua
Canon
Colorado
Melbourn
Salina Lake
Laguna del Perro
Salt Lake
LAND GRANT
CIBOLA NATIONAL FOREST
ATCHISON TOPEKA AND SANTA FE
SOUTHERN PACIFIC
Woodman Draw
Buffalo Draw
Rattlesnake Draw
Osita Draw
Chavez Draw
Salt Draw
McGillivray Draw
Red Canyon
Pintada Canyon
Compton Arroyo
Chinchonte Draw
Arroyo de Tajique
Arroyo del Cuervo
Priest Canyon
Barranca
Abo Canyon
Cueva Canyon
Arroyo Seco
Sawmill Canyon
Red Cloud Canyon

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

U. S. FOREST SERVICE
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
TORRANCE AREA, NEW MEXICO

SCALE IN MILES
1 0 1 2 3 4 5 6 7

SOIL ASSOCIATIONS

1	Washoe-Ildefonso association: Strongly sloping to steep, stony soils formed in mixed alluvium
2	Salas-Rock outcrops and slides association: Steep or very steep, stony soils on mountains, and Rock land
3	Wilcoxson-Supervisor-Pino association: Gently sloping to very steep soils formed over limestone, sandstone, schist, and felsite
4	Witt-Wilcoxson-Turkeysprings association: Gently sloping to very steep soils formed over limestone, sandstone, and shale and in valley fill; on foothills
5	Witt-Harvey-Manzano association: Nearly level to strongly sloping soils formed in valley fill or mixed alluvium
6	Willard-Ildefonso-Karde association: Level to strongly sloping soils formed in lake sediments on terraces; gently sloping to steep soils formed in wind-deposited materials on hills
7	Clovis-Otero-Rock land association: Gently sloping to very steep soils formed over acid igneous rocks and in valley fill
8	Tapia-Dean-Pastura association: Nearly level to strongly sloping soils formed over caliche on uplands
9	Penistaja-Steep rock land association: Nearly level to strongly sloping soils on uplands, and moderately sloping to very steep rocky areas on hillsides, mesa escarpments, and breaks
10	La Fonda-Alicia-Rock outcrop association: Gently sloping to strongly sloping soils formed in alluvium from red beds; moderately sloping to very steep rock outcrops
11	Otero-Palma-Trail association: Undulating to rolling soils formed in wind-reworked materials on upland alluvial fans

February 1968

1. *Washoe-Ildefonso association*

Strongly sloping to steep, stony soils formed in mixed alluvium

This association is on the western foot slopes of the Manzano Mountains. It consists of gravelly, cobbly, and stony soils (fig. 4) and makes up about 1 percent of the Torrance Area.

Washoe soils, the most extensive in the association, contain large amounts of gravel and cobblestones. They have a thin surface layer of brown cobbly loam. Below this is a moderately thick subsoil of reddish-brown gravelly clay loam, over a pinkish-white layer of gravel cemented with lime.

Ildefonso soils have a thin surface layer of dark-brown, limy stony sandy loam. They have a subsoil of limy gravelly loam. Below this is very gravelly sandy loam, high in content of lime and weakly cemented in the upper part.

Also in this association are gently sloping to strongly sloping Scholle soils, which are shallow over soft lime, and gently sloping to strongly sloping Tesajo soils, which are deep and very gravelly and are leached free of lime.

The soils of this association are not well suited to installation of earthen structures, such as farm ponds, because of rapid seepage in the sandy and gravelly strata. The topsoil can be used as fill in pond embankments if adequately compacted. Pipelines to carry water for livestock can be installed, but they must be bedded with topsoil in the very rocky or gravelly areas. Diversions, terraces, and waterways are not used in this association, because of the steep slopes and the unfavorable properties of the soils. The gravel, cobblestones, and stones are suitable for use as riprap or as material for pervious blankets.

This association is used mainly as native range. The vegetation is sparse because the climate is hot and dry. Short and mid grasses, juniper, cactus, and yucca make up most of the plant cover.

2. *Salas-Rock outcrops and slides association*

Steep or very steep, stony soils on mountains, and Rock land

This association is on the western slopes of the Manzano and Gallinas Mountains. It consists of steep or very steep, stony soils (see fig. 4) and of rock outcrops, rock slides, rock cliffs, and escarpments. The rock areas on the slopes of the Manzano Mountains are made up mostly of limestone exposed on the uplifted escarpment face and igneous intrusions below the limestone. The rock areas on the slopes of the Gallinas Mountains are sandstone and felsite. This association makes up about 2 percent of the Torrance Area.

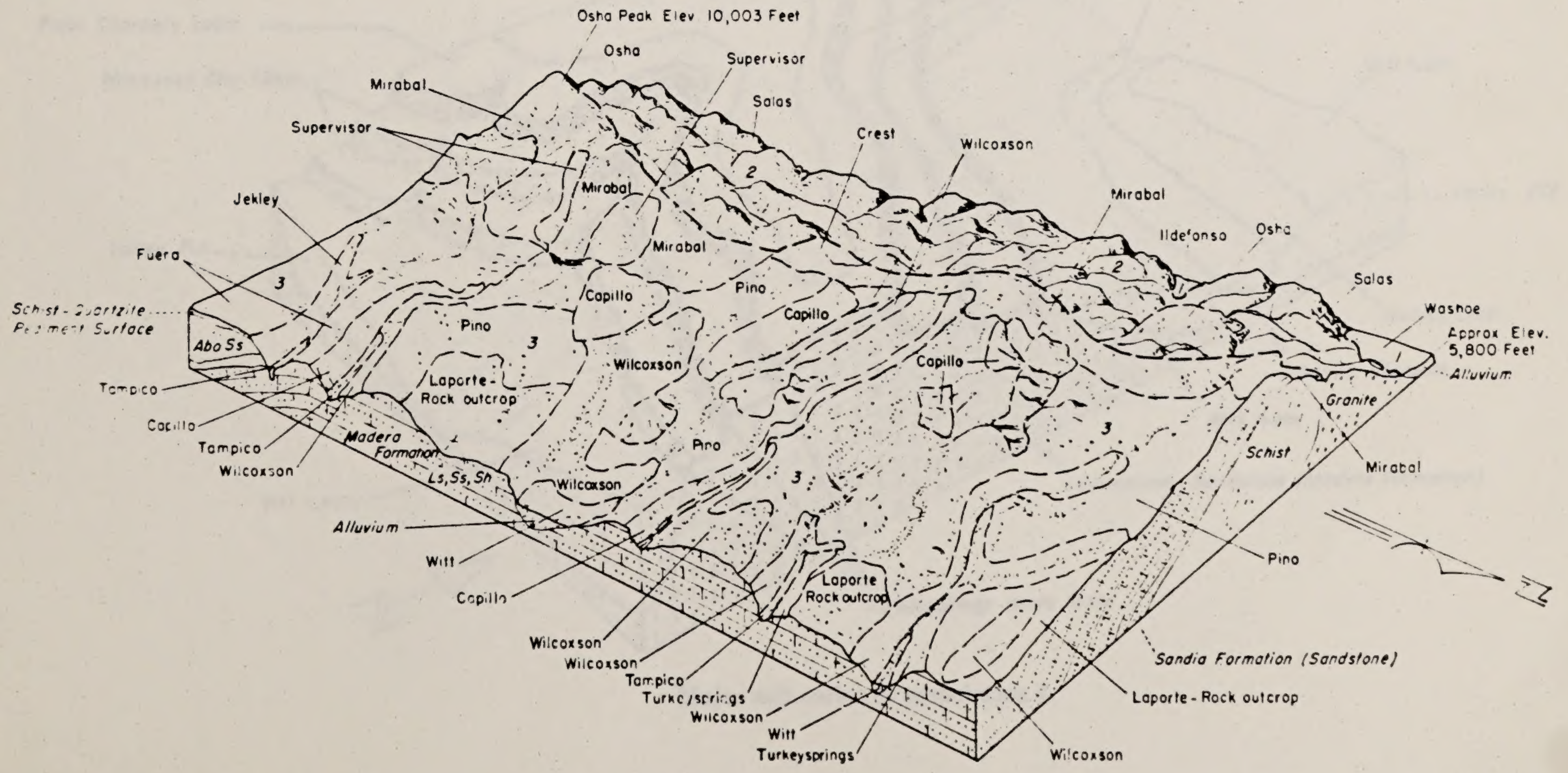
Salas soils, the most extensive in the association, have a surface layer of dark-brown stony loam. Their subsoil is reddish-brown stony clay loam. Their parent material weathered from light olive-gray schist bedrock.

The rock outcrops and slides are very steep. Geologic erosion removes the weathered rock material about as fast as it accumulates, and there is seldom enough soil to support plants.

Also in this association are Erramouspe and Osha soils, which are steep to very steep. Erramouspe soils are on slopes of the Gallinas Mountains. They are stony and droughty. Osha soils occur as piedmont fans on canyon side slopes of the Manzano Mountains. They are calcareous.

This association is generally not suited to conservation engineering structures, because the areas are steep and rocky and inaccessible. Some of the rock is suitable for use as riprap or as material for pervious blankets. In places there is enough soil material for constructing embankment-type ponds in the narrow, V-shaped drainageways that occur in the association. Concrete structures or small earthen dams can also be installed.

This association is used mainly for production of native forage for livestock and for wildlife habitats. The vegetation is mainly pinyon and juniper, short and mid grasses, mountain-mahogany, and cactus. Springs provide water for livestock and wildlife.


Osha Peak Elev 10,003 Feet
Osha
Supervisor
Salas
Mirabal
Supervisor
Mirabal
2
Crest
Wilcoxson
Jekley
Mirabal
Mirabal
Ildefonso
Osha
2
Fuera
3
Pino
Capillo
Salas
Schist - Quartzite Pediment Surface
Capillo
Pino
3
Capillo
Washoe
Approx Elev. 5,800 Feet
Alluvium
Abo Ss
Wilcoxson
Laporte - Rock outcrop
Tampico
Granite
Capillo
3
Tampico
Madera Formation
Pino
Schist
Mirabal
Wilcoxson
Ls, Ss, Sh
Wilcoxson
3
Alluvium
Witt
Pino
Laporte Rock outcrop
Capillo
Wilcoxson
Wilcoxson
Sandia Formation (Sandstone)
Tampico
Turkeysprings
Laporte - Rock outcrop
Wilcoxson
Witt
Turkeysprings
Wilcoxson

Major soil series of associations 1, 2, and 3.

4. Witt-Wilcoxson-Turkeysprings association

Gently sloping to very steep soils formed over limestone, sandstone, and shale and in valley fill; on foothills

This association is mainly in the foothills on the eastern slopes of the Manzano Mountains. It consists of deep, gently sloping to strongly sloping, upland soils and shallow and moderately deep, steep to very steep, wooded soils (fig. 5). It makes up about 12 percent of the Torrance Area.

Witt soils, the most extensive in the association, occur on gently sloping to strongly sloping alluvial fans. They have a thin surface layer of light-brown to brown loam. Their subsoil is reddish-brown to dark-brown clay loam that is leached free of lime in the upper part. Below this is pinkish-white, limy loam.

Wilcoxson soils are on upland ridge crests and on benches between ridges of shallow soils. They are gently sloping to strongly sloping. They have a moderately thick surface layer of dark-brown clay loam over a subsoil of very hard, reddish-brown clay that is limy in the lower part. The substratum is pinkish-white, very limy silty clay loam that grades into weathered limestone at a depth of about 4 feet, except in stony areas.

Turkeysprings soils are the least extensive of the major soils of the association, but they are the most prominent because of their stoniness and steep, wooded slopes. They occur on side slopes of ridges. They have a thin layer of decomposing forest litter over a moderately thick surface layer of dark grayish-brown stony loam. Their subsoil is brown stony clay that contains some visible lime in the lower part. Below this is a substratum of very pale brown, limy, very stony silt loam. Limestone bedrock is at a depth of 4 feet or less.

Pinon and Laporte soils occupy a large acreage in this association. These are shallow soils on crests and side slopes of ridges. Alicia, Encierro, and Washoe soils make up the rest of this association.

Witt soils have the best overall properties for engineering installations. They are moderately to slowly permeable and have moderate to high shrink-swell potential. Farm ponds, diversions, terraces, and pipelines can be installed easily because the soils are deep and free of stones.

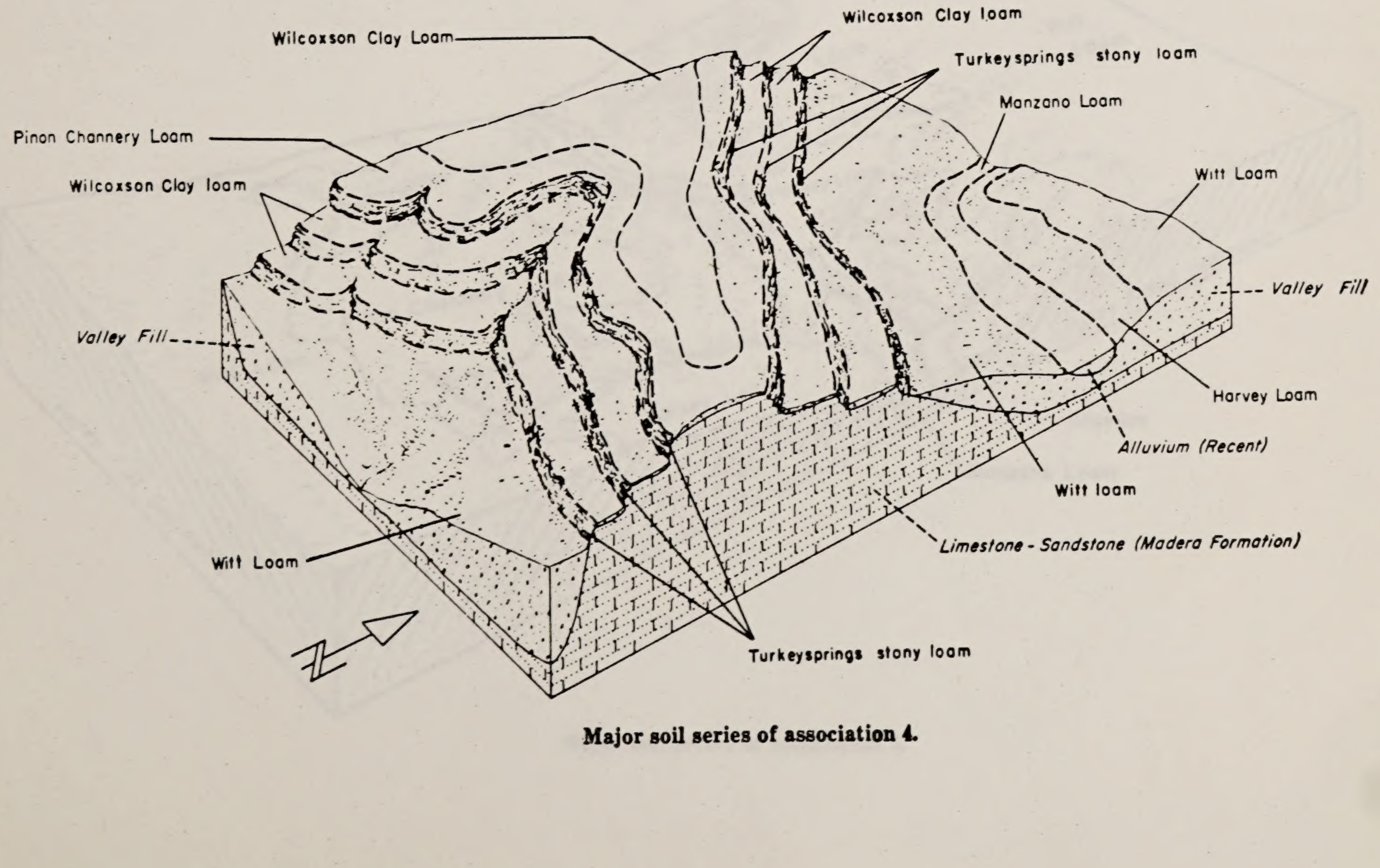
Wilcoxson soils also have good properties for engineering installations, such as terraces and diversions. In stony areas, however, where bedrock is at a depth of only 16 to 30 inches, these soils are unsuitable for construction of pit-type farm ponds or stock-water pipelines.

Turkeysprings soils can be used for constructing diversions and embankments for farm ponds, but care must be taken to have enough soil in the fill to make the embankment homogeneous, rather than mostly stone in some places.

Pinon and Laporte soils are not suitable for installation of conservation engineering structures, because bedrock is only about 10 inches below the surface. Alicia soils are suitable for construction of farm ponds, terraces, and diversions, and for installation of pipelines. Encierro soils are unsuitable for conservation engineering structures, because they are rocky and are underlain by sandstone bedrock at a depth of only 9 inches. Washoe soils are gravelly and have moderate seepage, but they can be used for water storage if the soil is adequately compacted.

The limestone rock that is near the surface in the Turkeysprings, Laporte, and Pinon soils is suitable for crushing for construction uses.

Many of the deep, upland areas in this association have been dryfarmed in the past, but in recent years most of



Major soil series of association 4.

these areas have been returned to native grass. Wheat, corn, and pinto beans are the principal crops on the remaining cropland. Much of this association is heavily wooded with pinyon and juniper, which provide a suitable habitat for deer, bear, and turkey. Some of the trees are harvested for fenceposts and firewood. Short and mid grasses, cool- and warm-season grasses, and cholla cactus, make up most of the ground cover. Much of this association provides good summer range for livestock. Major creeks and streams provide water.

5. *Witt-Harvey-Manzano association*

Nearly level to strongly sloping soils formed in valley fill or mixed alluvium

This association (fig. 6) is in the western and southern parts of the Torrance Area. It occurs on crests and side slopes of piedmont fans, on flood plains, and in swales. It consists of moderately deep and deep upland soils. The association makes up about 14 percent of the Torrance Area.

Witt soils, the most extensive, are mainly on the piedmont crests. They have a thin surface layer of light-brown loam that is leached free of lime. They have a thick subsoil of reddish-brown to dark-brown clay loam that is leached free of lime in the upper part. Pinkish-white, very limy loam begins at a depth of about 4 feet.

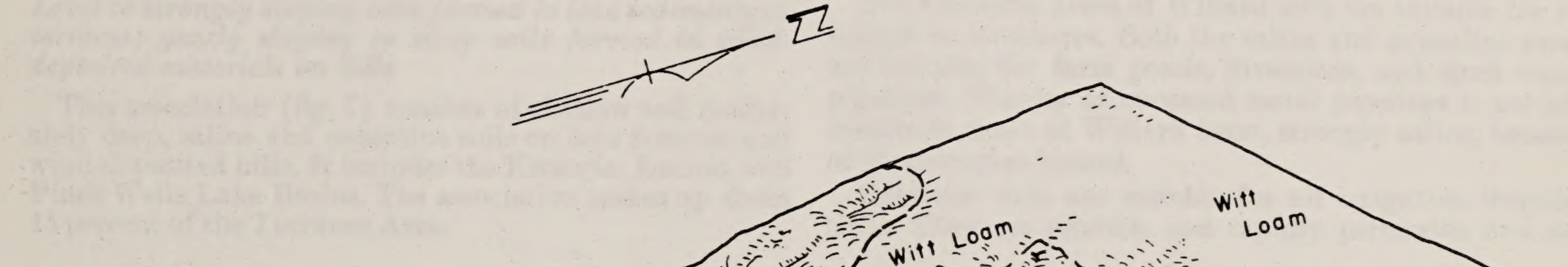
Harvey soils are mainly on the truncated side slopes of fans and are gently sloping to strongly sloping. They are limy to the surface. In most places they have a moderately thick surface layer of light-brown or grayish-brown loam. The lower part is more limy than the upper part. This layer grades through very pale brown loam to very limy, pink loam that is nearly impervious to roots.

Manzano soils have a thick surface layer of grayish-brown loam or clay loam over a thick subsoil of dark grayish-brown clay loam. They have a substratum of limy, brown light clay loam that is readily penetrated by roots, air, and water. They occur in swales and on flood plains.

Also in this association are Tapia, Pinon, and Dean soils, which are shallow, and Wilcoxson soils, which are deep. There are also areas of Carnero and Clovis soils.

Witt, Harvey, and Manzano soils have good overall characteristics for engineering installations. They are moderately to slowly permeable and have a moderate to high shrink-swell potential. They are well suited to irrigation structures and engineering practices. They are deep and free of stones. Farm ponds, diversions, terraces, and pipelines can be installed easily.

Tapia soils are underlain by semi-indurated caliche at a depth of less than 35 inches. They are not suitable for farm ponds, but diversions, terraces, and pipelines can be installed with little difficulty. Pinon soils are not suitable for conservation engineering structures, because they are underlain by bedrock at a depth of only about 10



Major soil series of association 5.

inches. Dean soils are gravelly and are moderately to rapidly permeable. They are not suitable for farm ponds. Diversions and terraces can be installed with difficulty. Wilcoxson soils have good characteristics for conservation engineering structures, except farm ponds. Their shallowness over bedrock makes them unsuitable for pit-type ponds.

This association was formerly a major area for dryland farming, but crop failures were common because of the unfavorable climate, and many farms were returned to rangeland. Nevertheless, this association is still the most extensively dryfarmed part of the Torrance Area. Wheat, corn, and pinto beans are the principal crops. About 45 percent of the irrigated acreage in the Area is in this association. Alfalfa, corn, pinto beans, wheat, and potatoes are the main crops. Witt soils, the main dryland soils, are also the most extensively eroded soils of the association. Manzano soils are the most fertile and most productive cropland and rangeland soils of the Torrance Area. The Pinon soils in this association are wooded.

Much of the acreage of this association in the southern part of the Area has moderate to heavy stands of pinyon and juniper, which provide not only habitats for wildlife but also fenceposts and firewood.

Areas of this association not used for cultivation or trees are used for range. Short and mid grasses and cactus are the dominant vegetation.

6. *Willard-Ildefonso-Karde association*

Level to strongly sloping soils formed in lake sediments on terraces; gently sloping to steep soils formed in wind-deposited materials on hills

This association (fig. 7) consists of shallow and moderately deep, saline and nonsaline soils on lake terraces and wind-deposited hills. It includes the Estancia, Encino, and Pinos Wells Lake Basins. The association makes up about 15 percent of the Torrance Area.

Willard soils, the most extensive, are slightly saline near the lake margins, and they are progressively more saline toward the center of the lake basins. About two-thirds of the acreage of Willard soils is moderately to strongly saline and is affected by alkali. These soils have a moderately thick surface layer of light brownish-gray loam and a subsoil of pale-brown, limy clay loam. Below this is very limy, light yellowish-brown light clay loam. Lacustrine lake sediments generally begin at a depth of about 2 feet, but the depth ranges from about 10 inches to 30 inches.

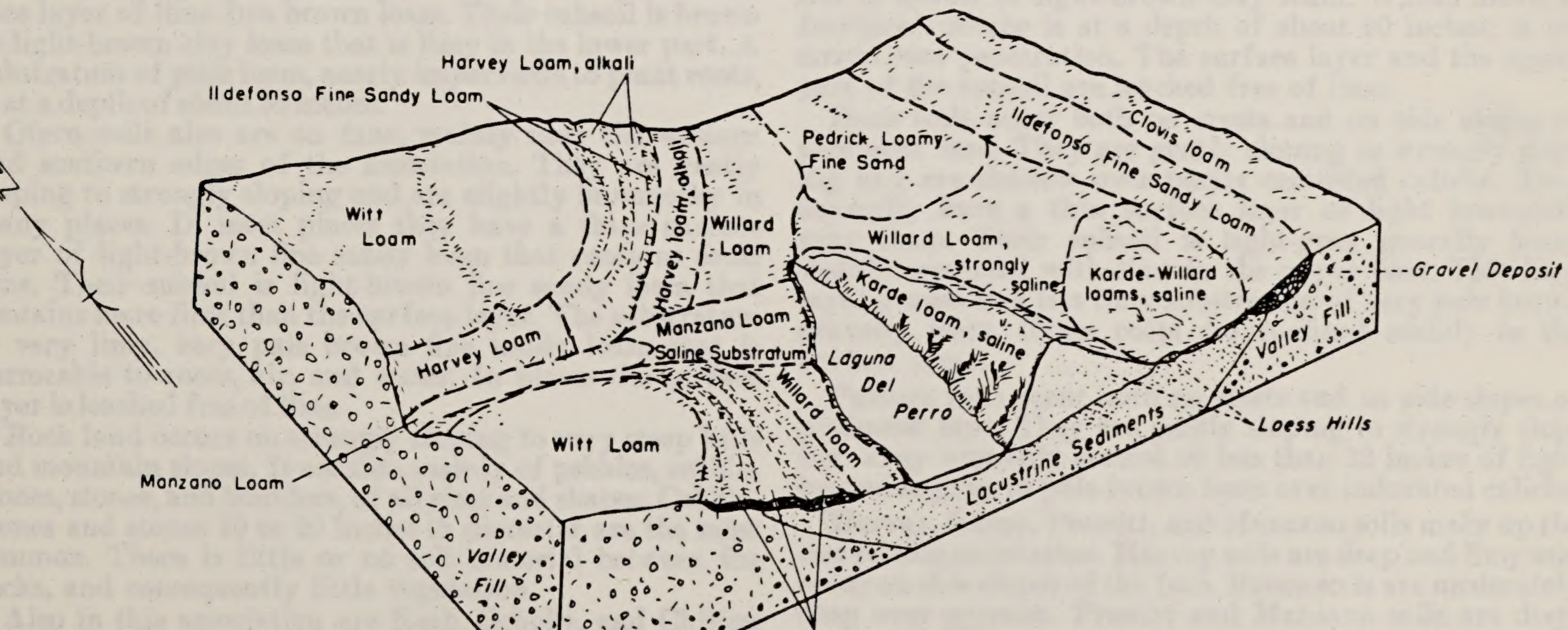
Ildefonso soils occur on the margins of the lake basins, on shoreline benches. They have a moderately thick surface layer of brown to pale-brown, limy fine sandy loam and a subsoil of pale-brown, limy gravelly fine sandy loam. Below this is very pale brown, very limy gravelly fine sandy loam. In places the surface layer is loamy fine sand.

Karde soils occur on wind-deposited dunes or hills on the leeward side of playa lakes. The playas are near the center of the lake basins. These soils have a thin surface layer of light-gray, limy loam over several feet of pale-yellow silt loam that is high in content of lime and soluble salts. They are moderately to strongly saline.

Also in this association are the moderately deep, coarse-textured Pedrick soils, the deep and fertile Manzano soils on broad flood plains near the lake margins, and the alkaline Harvey soils near the western margin of the Estancia Lake Basin.

The nonsaline areas of Willard soils are suitable for all irrigation structures. Both the saline and nonsaline areas are suitable for farm ponds, diversions, and stock-water pipelines. The use of uncoated metal pipelines is not advisable in areas of Willard loam, strongly saline, because of the corrosion hazard.

Ildefonso soils are suitable for all irrigation installations. They are erodible and rapidly permeable and are


Harvey Loam, alkali
Ildefonso Fine Sandy Loam
Pedrick Loamy Fine Sand
Ildefonso Fine Sandy Loam
Clovis loam
Witt Loam
Harvey loam, alkali
Willard Loam
Willard Loam, strongly saline
Karde-Willard loams, saline
Gravel Deposit
Karde loam, saline
Fill
Valley
Harvey Loam
Manzano Loam
Saline Substratum
Laguna Del Perro
Willard loam
Witt Loam
Loess Hills
Lacustrine Sediments
Manzano Loam
Valley Fill
Ildefonso Fine Sandy Loam

Major soil series of association 6.

not well suited to embankments or farm ponds because of a seepage hazard. Pipelines can be installed.

Karde soils are suitable for building stock ponds, diversions, and terraces. Pipelines can be installed easily.

Pedrick soils are erodible and are rapidly permeable. They make fair embankments, but rapid seepage can be expected if they are used for farm ponds, because the soil material is difficult to compact.

Harvey soils in this association are normally alkaline and saline. They are well suited to all conservation engineering structures or practices, but stock-water pipelines should be of plastic material because of the hazard of corrosion of metal pipes.

About 55 percent of the irrigated acreage in the Area is in this association. The main irrigated soils are the Manzano soils, the Ildefonso soils, and the nonsaline areas of the Willard soils. Alfalfa, pasture, corn, sugar beets, and barley are the principal crops. The rest of this association is used for range. Short and mid grasses and chamiza are the main vegetation. Salt-tolerant grasses are dominant. There are few trees except those planted around farmsteads. Underground water is abundant in most places, but the water in the lower part of the lake basins is generally unsuitable for irrigation. The saline-alkali Willard soils should not be irrigated, because most crops cannot tolerate the salt.

7. *Clovis-Otero-Rock land association*

Gently sloping to very steep soils formed over acid igneous rocks and in valley fill

This association occurs mainly in the Pedernal Hills, but also as smaller areas in the eastern part of Torrance County. It consists of both deep and shallow soils that formed in valley fill washed from the surrounding hills. The association makes up about 6 percent of the survey Area.

Clovis soils, the most extensive in the association, occur on upland piedmont fans. They are gently sloping to moderately sloping. In most places they have a thin surface layer of lime-free brown loam. Their subsoil is brown to light-brown clay loam that is limy in the lower part. A substratum of pink loam, nearly impervious to plant roots, is at a depth of about 30 inches.

Otero soils also are on fans, mainly near the western and southern edges of the association. They are gently sloping to strongly sloping and are slightly hummocky in many places. In most places they have a thick surface layer of light-brown fine sandy loam that contains some lime. Their subsoil is light-brown fine sandy loam that contains more lime than the surface layer. The substratum is very limy, very pale brown fine sandy loam that is permeable to roots, air, and water. In places the surface layer is leached free of lime.

Rock land occurs on strongly sloping to very steep hills and mountain slopes. It consists mainly of pebbles, cobblestones, stones, and boulders, of all sizes and shapes. Cobblestones and stones 10 to 20 inches in diameter are the most common. There is little or no soil material between the rocks, and consequently little vegetation.

Also in this association are Kech, Scholle, and Chilton soils, which are shallow and gravelly. Kech soils are on low hills and ridgetops, Scholle soils on the upper part of piedmont fans, and Chilton soils on the side slopes of piedmont fans.

Some of the areas of Clovis and Otero soils have been dryfarmed, and most of these areas have been severely eroded by wind. Many abandoned fields have either reverted to grassland by natural reseeding or have been seeded.

Underground water is more difficult to obtain in this association than in other parts of the Area. The water table is deep, and dry holes are common. Ponds are needed to furnish water for livestock. Installation of pipelines should be considered if a source of water is available. Clovis and Scholle soils are well suited to both pit-type and embankment-type ponds. Otero and Chilton soils are too permeable to be suitable for ponds, and Kech soils are too shallow to be suitable for either ponds or pipelines. Clovis, Otero, Scholle, and Chilton soils are well suited to installation of pipelines. Otero soils are difficult to compact and are erodible. They should not be used for dikes, diversions, terraces, or embankments.

This association is used mainly for range. The vegetation is mostly short and mid grasses, cactus, and yucca. There is some pinyon pine and juniper at the higher elevations and some scrub oak on areas of Rock land. Rock land and the gravelly hills offer a suitable habitat for antelope, and most of the antelope population of the Torrance Area is in this association.

8. *Tapia-Dean-Pastura association*

Nearly level to strongly sloping soils formed over caliche on uplands

This association, the largest in the survey Area, is almost entirely in the eastern part of Torrance County. It consists of shallow to moderately deep soils underlain by caliche. The association makes up 18 percent of the Torrance Area.

Tapia soils, the most extensive in the association, occur on crests of piedmont fans. They are nearly level to moderately sloping and are moderately deep. In most places they have a thin surface layer of brown loam. Their subsoil is brown to light-brown clay loam. White, massive, fractured caliche is at a depth of about 20 inches; it restricts root penetration. The surface layer and the upper part of the subsoil are leached free of lime.

Dean soils occur both on crests and on side slopes of piedmont fans. They are gently sloping to strongly sloping and are shallow over partly cemented caliche. They normally have a thin surface layer of light brownish-gray loam. Their subsoil is light-gray gravelly loam, weakly cemented with lime in the upper part. This limy layer grades to a less limy substratum of very pale brown gravelly loam. Grass roots are confined mainly to the surface layer.

Pastura soils occur both on crests and on side slopes of piedmont fans. They are gently sloping to strongly sloping. They normally consist of less than 12 inches of light brownish-gray to pale-brown loam over indurated caliche.

Harvey, Rance, Prewitt, and Manzano soils make up the rest of this association. Harvey soils are deep and limy and occur on side slopes of the fans. Rance soils are moderately deep over gypsum. Prewitt and Manzano soils are deep, dark-colored, loamy soils in narrow drainageways.

Many areas of Tapia soils have been dryfarmed and then abandoned. Erosion has removed much of the topsoil from these abandoned fields, and it is still a hazard. Nearly not well suited to embankments or farm ponds because of a seepage hazard. Pipelines can be installed.

Karde soils are suitable for building stock ponds, diversions, and terraces. Pipelines can be installed easily.

Pedrick soils are erodible and are rapidly permeable. They make fair embankments, but rapid seepage can be expected if they are used for farm ponds, because the soil material is difficult to compact.

Harvey soils in this association are normally alkaline and saline. They are well suited to all conservation engineering structures or practices, but stock-water pipelines should be of plastic material because of the hazard of corrosion of metal pipes.

About 85 percent of the irrigated acreage in the Area is in this association. The main irrigated soils are the Manzano soils, the Harvey soils, and the nonsaline areas of the Willard soils. Alfalfa, pasture, corn, sugar beets, and barley are the principal crops. The rest of this association is used for range. Short and mid grasses and chamiza are the main vegetation. Salt-tolerant grasses are dominant. There are few trees except those planted around farmsteads. Underground water is abundant in most places, but the water in the lower part of the lake basin is generally unsuitable for irrigation. The saline-alkali Willard soils should not be irrigated, because most crops cannot tolerate the salt.

7. Clovis-Otero-Rock land association

Gently sloping to very steep soils formed over acid igneous rocks and in valley fill

This association occurs mainly in the Pedernal Hills, but also as smaller areas in the eastern part of Torrance County. It consists of both deep and shallow soils that formed in valley fill washed from the surrounding hills. The association makes up about 6 percent of the survey Area.

Clovis soils, the most extensive in the association, occur on upland piedmont fans. They are gently sloping to moderately sloping. In most places they have a thin surface layer of lime-free brown loam. Their subsoil is brown to light-brown clay loam that is limy in the lower part. A substratum of pink loam, nearly impervious to plant roots, is at a depth of about 30 inches.

Otero soils also are on fans, mainly near the western and southern edges of the association. They are gently sloping to strongly sloping and are slightly hummocky in many places. In most places they have a thick surface layer of light-brown fine sandy loam that contains some lime. Their subsoil is light-brown fine sandy loam that contains more lime than the surface layer. The substratum is very limy, very pale brown fine sandy loam that is permeable to roots, air, and water. In places the surface layer is leached free of lime.

Rock land occurs on strongly sloping to very steep hills and mountain slopes. It consists mainly of pebbles, cobblestones, stones, and boulders, of all sizes and shapes. Cobblestones and stones 10 to 20 inches in diameter are the most common. There is little or no soil material between the rocks, and consequently little vegetation.

Also in this association are Kech, Scholle, and Chilton soils, which are shallow and gravelly. Kech soils are on low hills and ridgetops, Scholle soils on the upper part of piedmont fans, and Chilton soils on the side slopes of piedmont fans.

Some of the areas of Clovis and Otero soils have been dryfarmed, and most of these areas have been severely eroded by wind. Many abandoned fields have either reverted to grassland by natural reseeding or have been seeded.

Underground water is more difficult to obtain in this association than in other parts of the Area. The water table is deep, and dry holes are common. Ponds are needed to furnish water for livestock. Installation of pipelines should be considered if a source of water is available. Clovis and Scholle soils are well suited to both pit-type and embankment-type ponds. Otero and Chilton soils are too permeable to be suitable for ponds, and Kech soils are too shallow to be suitable for either ponds or pipelines. Clovis, Otero, Scholle, and Chilton soils are well suited to installation of pipelines. Otero soils are difficult to compact and are erodible. They should not be used for dikes, diversions, terraces, or embankments.

This association is used mainly for range. The vegetation is mostly short and mid grasses, cactus, and yucca. There is some pinyon pine and juniper at the higher elevations and some scrub oak on areas of Rock land. Rock land and the gravelly hills offer a suitable habitat for antelope, and most of the antelope population of the Torrance Area is in this association.

8. Tapia-Dean-Pastura association

Nearly level to strongly sloping soils formed over caliche on uplands

This association, the largest in the survey Area, is almost entirely in the eastern part of Torrance County. It consists of shallow to moderately deep soils underlain by caliche. The association makes up 35 percent of the Torrance Area.

Tapia soils, the most extensive in the association, occur on crests of piedmont fans. They are nearly level to moderately sloping and are moderately deep. In most places they have a thin surface layer of brown loam. Their subsoil is brown to light-brown clay loam. White, massive, firm caliche is at a depth of about 20 inches; it restricts root penetration. The surface layer and the upper part of the subsoil are leached free of lime.

Dean soils occur both on crests and on side slopes of piedmont fans. They are gently sloping to strongly sloping and are shallow over partly cemented caliche. They normally have a thin surface layer of light brownish-gray loam. Their subsoil is light-gray gravelly loam, weakly cemented with lime in the upper part. This limy layer grades to a less limy substratum of very pale brown gravelly loam. Grass roots are confined mainly to the surface layer.

Pastura soils occur both on crests and on side slopes of piedmont fans. They are gently sloping to strongly sloping. They normally consist of less than 12 inches of light brownish-gray to pale-brown loam over indurated caliche.

Harvey, Ildefonso, Prewitt, and Manzano soils make up the rest of this association. Harvey soils are deep and limy and occur on side slopes of the fans. Ildefonso soils are moderately deep over gypsum. Prewitt and Manzano soils are deep, dark-colored, loamy soils in narrow drainageways.

Many areas of Tapia soils have been dryfarmed and then abandoned. Erosion has removed much of the topsoil from these abandoned fields, and it is still a hazard. Nearly all of the areas formerly cultivated have been reseeded to native grasses and returned to range. A few areas have been left to revert naturally to grass.

The consolidated caliche underlying the major soils of this association interferes with construction of pit-type ponds for watering livestock. Embankment-type ponds are watertight, but sites suitable for such ponds are scarce. Usually, large areas must be stripped of topsoil in order to get enough soil material to build embankments. The best sites are in areas of Prewitt and Manzano soils, two of the minor soils of this association, where enough good-quality soil material is available. In some areas the caliche underlying Dean and Pastura soils has been excavated for use in road construction.

Pipelines can be installed in the soils of this association, but they must be bedded with topsoil in areas where there are coarse fragments of caliche. Rance soils are underlain by gypsum and, because of the piping hazard, should not be used for earthen structures.

This association is used mainly for native range. Short and mid grasses and cactus are the main vegetation, but there are a few juniper trees.

9. Penistaja-Steep rock land association

Nearly level to strongly sloping soils on uplands, and moderately sloping to very steep rocky areas on hillsides, mesa escarpments, and breaks

This association is in the southern and eastern parts of the Torrance Area. It consists of shallow, moderately deep, and deep soils, and of steep rock land (fig. 8). The soils are on upland piedmont fans. The rock land consists of moderately sloping to very steep hillsides, mesa escarpments, and breaks. This association makes up about 15 percent of the survey Area.

Penistaja soils, the most extensive in the association, normally have a thin surface layer of brown fine sandy loam over a subsoil of light-brown or reddish-brown sandy clay loam. Below this is light reddish-brown fine sandy loam that is high in lime content but permeable to roots, air, and water. Penistaja soils are deep and are leached of lime to a depth of about 20 inches.

Steep rock land is also extensive in this association. The rock is mainly sandstone. Thin layers of limestone cap the sandstone in some of the areas near the crest of escarpments and hills. The rock land rises some 500 feet or more above the lower lying uplands. Ledges and stairstep topography are common. Shallow pockets of soil between the ledges support most of the plant life.

Also in this association are moderately deep Hagerman soils and shallow Bernal, Travessilla, and Laporte soils.

Farm ponds, diversions, terraces, and pipelines can be constructed in the Penistaja soils, but some seepage can be expected in ponds unless the soils are well compacted. In places it is necessary to plait the excavated pit with finer textured subsoil material.

Hagerman soils are well suited to all conservation engineering structures, except farm ponds. In most places bedrock is too near the surface for pit-type ponds, but the surface layer and the subsoil are suitable for embankment-type ponds. In places the soil is too shallow over bedrock for pipelines, unless the rock is ripped or blasted out.

Bernal, Travessilla, and Laporte soils are too shallow and the rock land is too steep and rough for engineering construction. Pipelines could be installed, but the rock would have to be blasted out.

Erosion is a problem in constructing waterways on Hagerman and Penistaja soils, unless protective measures are applied.

Nearly all of this association is used for range. The upland soils are the most productive grassland soils in the survey Area. The vegetation consists of light to heavy stands of pinyon and juniper, short and mid grasses, cactus, and yucca. Brush control is not difficult on the upland soils. The trees and understory vegetation provide a suitable habitat for deer.

A few areas of Penistaja soils are used for small grains and row crops. There are many abandoned fields—formerly in cultivation—that have been severely eroded by wind. Range reseeding has been successful on these old fields.

10. La Fonda-Alicia-Rock outcrop association

Gently sloping to strongly sloping soils formed in alluvium from red beds; moderately sloping to very steep rock outcrops

This association is mainly in the eastern and southwestern parts of the Torrance Area. It consists of deep, loamy soils on upland piedmont fans and moderately sloping to very steep rock outcrops. This association makes up about 9 percent of the survey Area.

La Fonda soils, the most extensive in the association, normally have a thin surface layer of reddish-brown loam over a subsoil of light reddish-brown heavy loam. Below this is light reddish-brown loam that is more limy than the surface layer and the subsoil.

Alicia soils have a moderately thick surface layer of reddish-brown loam. Their subsoil is reddish-brown clay loam that is leached of lime in the upper part. The substratum is light reddish-brown, limy loam.

Rock outcrops are moderately sloping to very steep. They are on side slopes of hills and escarpments, and in breaks areas. The rocks are dominantly red-bed shale, siltstone, and sandstone, but some are limestone, gypsum, and caliche. These rocky areas erode rapidly, and soil accumulates too slowly to support much plant life. In places the outcrops are dissected by numerous shallow gullies, and in other places the surface relief has a stairstep appearance.

In some areas the slopes are nearly vertical, and the ridgetops are 200 feet above the surrounding uplands.

Also in this association are Encierro, Chilton, Scholle, and Pinon soils and areas of Steep rock land. Encierro soils are shallow over sandstone; they occur on rolling ridge crests and side slopes. Chilton soils are limy and gravelly; they occur on side slopes of piedmont fans. Scholle soils are gravelly; they occur on crests of gravelly piedmont fans. Pinon soils are shallow over limestone bedrock; they occur on wooded ridge crests.

The soils of this association are highly susceptible to water erosion, which rapidly forms deep gullies and canyons. They are unstable and are difficult to seal. They also slake easily when saturated, and consequently are subject to piping. At times, spillways require repair after overflow because of the erodibility of the soils.

Farm ponds can be constructed in the La Fonda and Alicia soils. Pit-type ponds with desilting basins are more suitable than other types. Pipelines for livestock water can be installed in all of the soils of this association, with the exception of Pinon and Encierro soils, which are shallow.

This association is mostly over red beds, and its soils are the most susceptible to water erosion of any in the survey Area. It is suited to grasses, and most of the acreage is used for range. Short and mid grasses, cactus, yucca, and scattered scrub trees are the main vegetation. A few areas are dryfarmed to row crops. There are many old fields, and most of these are severely eroded. They are rapidly reverting to rangeland, either by seeding or by natural regeneration of forage plants.

11. Otero-Palma-Trail association

Undulating to rolling soils formed in wind-reworked materials on upland alluvial fans

This association is mainly in the southern part of the survey Area. It consists mostly of deep, sandy soils on undulating upland fans. It makes up about 4 percent of the survey Area.

Otero soils, the most extensive, are limy. They normally have a moderately thick surface layer of light-brown fine sandy loam or loamy fine sand over a similar, but more limy, subsoil. The substratum is very pale brown fine sandy loam that has more visible lime than the subsoil. In places the surface layer is leached of lime.

Palma soils are normally leached of lime in the surface layer and the upper part of the subsoil. They have a thin surface layer of brown or reddish-brown fine sandy loam or loamy fine sand over a subsoil of reddish-brown heavy fine sandy loam. The lower part is lighter colored and contains some visible lime. Below this is light reddish-brown fine sandy loam that contains much visible lime.

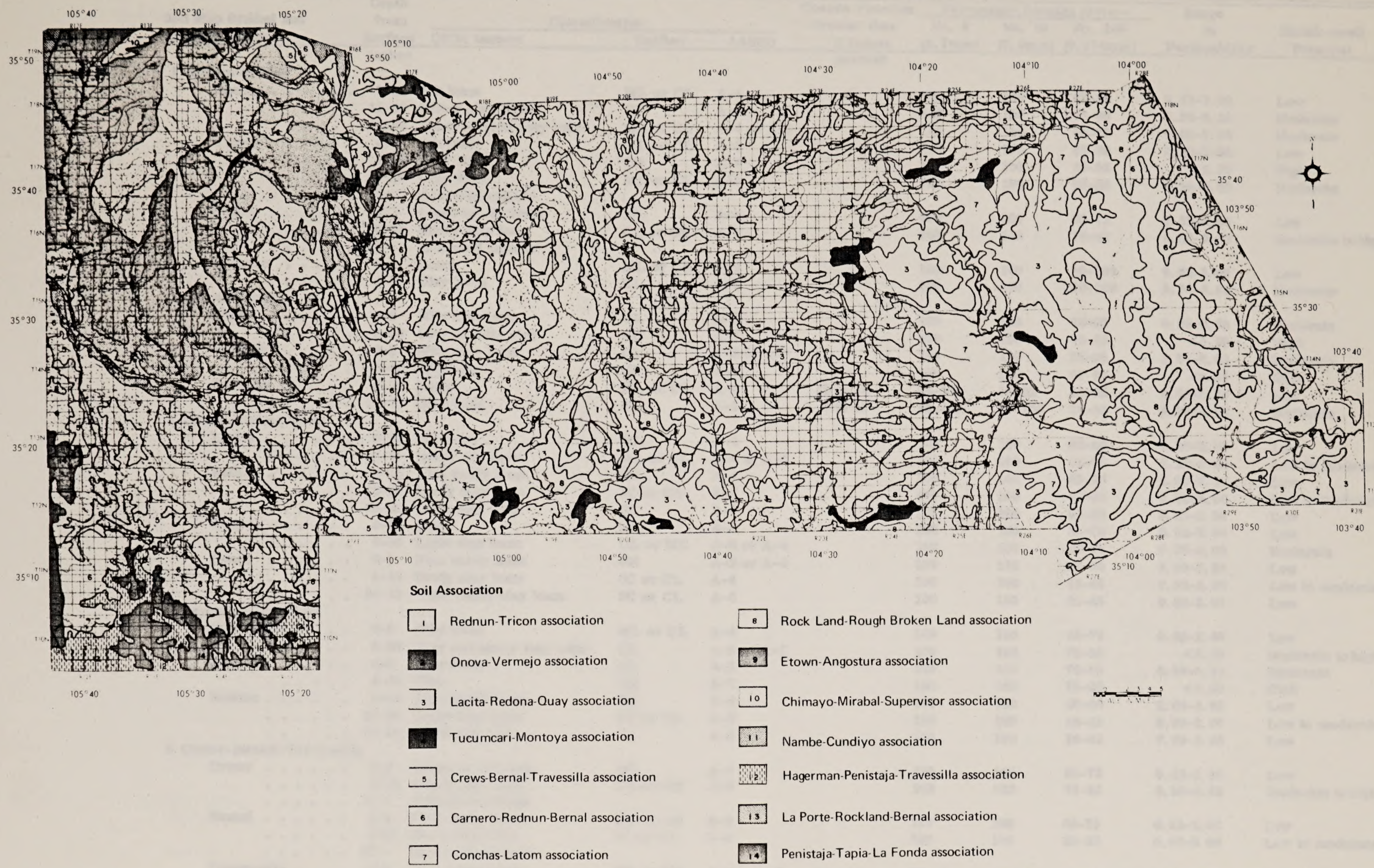
Trail soils are the least extensive of the major soils in this association. They are nonlimy. They normally have a thin surface layer of pale-brown loamy fine sand over deep deposits of brown fine sand.

Penistaja and Chupadera soils make up the rest of the association. The Penistaja soils are deep and nonlimy; they have a sandy clay loam subsoil. The Chupadera soils are moderately deep and limy and overlie limestone bedrock.

All of the soils of this association are rapidly permeable. They are highly susceptible to water erosion and to wind erosion.

Earthen structures constructed on these soils do not function satisfactorily unless sealing materials are used. Stock ponds often leak and are difficult to seal. Range pipelines are well suited to all of the soils, except the Chupadera soils, which are underlain by fractured limestone at a depth of about 20 to 30 inches.

This association is used mainly for native forage. It supports a moderate to heavy stand of pinyon and juniper, and some of the trees are cut for fenceposts and firewood. Short, mid, and tall grasses, and yucca are the common ground cover. Many old fields are scattered throughout the association, and most have been severely eroded by wind. Only a few remain to be reseeded. These abandoned fields need protection from overgrazing until the plant cover is well established.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Soil Association
1 Rednun-Tricon association
2 Onova-Vermejo association
3 Lacita-Redona-Quay association
4 Tucumcari-Montoya association
5 Crews-Bernal-Travessilla association
6 Carnero-Rednun-Bernal association
7 Conchas-Latom association
8 Rock Land-Rough Broken Land association
9 Etown-Angostura association
10 Chimayo-Mirabal-Supervisor association
11 Nambe-Cundiyo association
12 Hagerman-Penistaja-Travessilla association
13 La Porte-Rockland-Bernal association
14 Penistaja-Tapia-La Fonda association

Figure 1. General Soil Map of San Miguel County, New Mexico

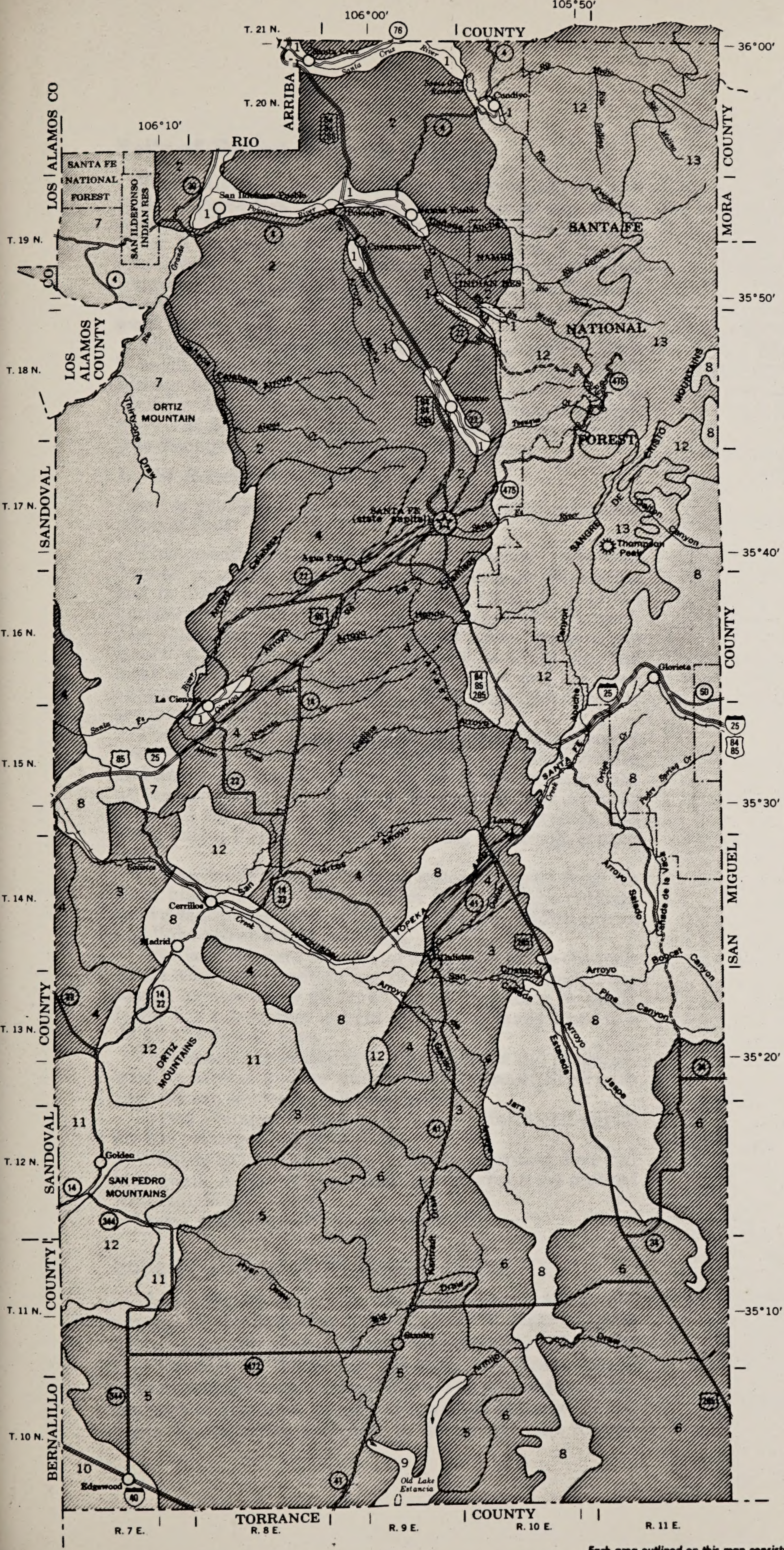
Engineering soil groups and estimated properties, San Miguel County

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	inches				percent					
1 Redmun-Tricon										
Redmun	0-11	Silt loam	ML or CL	A-4		100	100	65-90	0.63-2.00	Low
. . . . . .	11-35	Heavy clay loam	CL	A-6		100	100	70-90	0.20-6.30	Moderate
. . . . . .	35-56	Loam or light clay loam	ML or CL	A-4 or A-6		100	100	60-75	0.63-2.00	Moderate
Tricon	0-7	Silt loam	ML or CL	A-4		100	100	65-90	0.63-2.00	Low
. . . . . .	7-20	Silty clay	CH	A-7		100	100	90-95	<0.20	High
. . . . . .	20-30	Clay loam	ML or CL	A-6		100	100	70-80	0.20-0.63	Moderate
. . . . . .	30 +	Indurated caliche								
Crews	0-6	Loam or silt loam	ML	A-4		100	100	60-75	0.63-2.00	Low
. . . . . .	6-16	Heavy clay loam	CL or CH	A-6		100	100	75-95	0.20-0.63	Moderate to high
. . . . . .	16 +	Indurated caliche								
Carnero	0-6	Loam	ML or CL	A-4		100	100	90-100	0.63-2.00	Low
. . . . . .	6-36	Clay loam	CL	A-6		100	100	90-100	0.20-0.63	Moderate
2 Onova-Vermejo										
Onova	0-8	Silty clay loam	CL	A-6		100	100	85-95	0.20-0.63	Moderate
. . . . . .	8-60	Clay or silty clay	CH	A-7		100	100	75-95	<0.20	High
Vermejo	0-5	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
. . . . . .	5-60	Silty clay	CH	A-7		100	100	90-95	<0.20	High
Penrose	0-10	Loam	ML or CL	A-4	10 to 15	85-95	85-95	50-65	0.63-2.00	Low
. . . . . .	10-16	Clay loam	CL	A-6	5 to 10	95-100	95-100	70-80	0.20-0.63	Moderate
3 Lacita-Redona-Quay										
Lacita	0-24	Silt loam	ML	A-4		100	100	65-90	0.20-2.00	Low
. . . . . .	24-60	Heavy silt loam	ML or CL	A-4 or A-6		100	100	75-95	0.20-0.63	Low to moderate
Redona	0-10	Fine sandy loam	SM	A-4		100	100	40-60	2.00-6.30	Low
. . . . . .	10-30	Sandy clay loam	SC or CL	A-6		100	100	43-65	0.63-2.00	Low to moderate
. . . . . .	30-60	Light clay loam	CL	A-6		100	100	50-65	0.63-2.00	Low
Quay	0-9	Loam	ML	A-4		100	100	55-70	0.63-2.00	Low
. . . . . .	9-50	Light clay loam	CL or ML	A-6 or A-4		100	100	55-75	0.20-0.63	Moderate
Canez	0-8	Fine sandy loam	SM	A-2 or A-4		100	100	35-55	2.00-6.30	Low
. . . . . .	8-24	Sandy clay loam	SC or CL	A-6		100	100	45-65	0.63-2.00	Low to moderate
. . . . . .	24-60	Light sandy clay loam	SC or CL	A-6		100	100	35-65	0.63-2.00	Low
4 Tucumcari-Montoya										
Tucumcari	0-8	Clay loam	ML or CL	A-4		100	100	55-75	0.63-2.00	Low
. . . . . .	8-60	Clay and heavy clay loam	CL	A-6 or A-7		100	100	75-95	<0.20	Moderate to high
Montoya	0-4	Clay loam	CL	A-6		100	100	70-90	0.20-0.63	Moderate
. . . . . .	4-60	Clay	CH	A-7		100	100	75-95	<0.20	High
Redona	0-10	Fine sandy loam	SM	A-4		100	100	40-60	2.00-6.30	Low
. . . . . .	10-30	Sandy clay loam	SC or CL	A-6		100	100	45-65	0.63-2.00	Low to moderate
. . . . . .	30-60	Light clay loam	CL	A-6		100	100	50-65	0.63-2.00	Low
5 Crews-Bernal-Travessilla										
Crews	0-6	Loam or silt loam	ML	A-4		100	100	60-75	0.63-2.00	Low
. . . . . .	6-16	Heavy clay loam	CL or CH	A-6		100	100	75-95	0.20-0.63	Moderate to high
. . . . . .	16 +	Indurated caliche								
Bernal	0-3	Fine sandy loam	ML or SM	A-4		100	100	50-75	0.63-2.00	Low
. . . . . .	3-12	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
. . . . . .	12 +	Sandstone bedrock								
Travessilla	0-8	Fine sandy loam	SM or ML	A-4 or A-2	5 to 15	85-95	75-90	25-50	2.00-6.30	Low
Pastura	0-9	Stony loam	ML or CL	A-4 or A-6		65-80*	60-75*	50-65*	0.63-2.00	Low
. . . . . .	9 +	Indurated caliche								
Carnero	0-6	Loam	ML or CL	A-4		100	100	90-100	0.63-2.00	Low
. . . . . .	6-36	Clay loam	CL	A-6		100	100	90-100	0.63-2.00	Moderate

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	inches				percent					
6 Carnero-Rednun-Bernal										
Carnero	0-6	Loam	ML or CL	A-4		100	100	90-100	0.63-2.00	Low
	6-36	Clay loam	CL	A-6		100	100	90-100	0.63-2.00	Moderate
Rednun	0-11	Silt loam	ML or CL	A-4		100	100	65-90	0.63-2.00	Low
	11-35	Heavy clay loam	CL	A-6		100	100	70-90	0.20-0.63	Moderate
	35-56	Loam or light clay loam	ML or CL	A-4 or A-6		100	100	65-90	0.63-2.00	Moderate
Bernal	0-3	Fine sandy loam	ML or SM	A-4		100	100	50-75	0.63-2.00	Low
	3-12	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
	12 +	Sandstone bedrock								
Travessilla	0-8	Fine sandy loam	SM or ML	A-4 or A-2	5 to 15	85-95	75-90	25-50	2.00-6.30	Low
Rock land		(a miscellaneous land type - no estimates made)								
7 Conchas-Latom										
Conchas	0-5	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low
	5-30	Clay loam	CL	A-6		95-100	95-100	70-95	0.63-2.00	Moderate
	30 +	Sandstone and shale								
Latom	0-5	Stony sandy loam	GM	A-2 or A-4		80-90	75-85	30-50	0.63-2.00	Low
	5-9	Stony sandy clay loam	GM	A-2 or A-4		75-85	65-80	30-45	0.63-2.00	Low
Quay	0-9	Loam	ML	A-4		100	100	55-70	0.63-2.00	Low
	9-50	Light clay loam	CL or ML	A-6 or A-4		100	100	55-75	0.20-0.63	Moderate
Rock land		(a miscellaneous land type - no estimates made)								
8 Rock Land-Rough Broken Land										
Rock Land		(a miscellaneous land type - no estimates made)								
Rough Broken Land.		(a miscellaneous land type - no estimates made)								
Bernal	0-3	Fine sandy loam	ML or SM	A-4		100	100	50-75	0.63-2.00	Low
	3-12	Sandy clay loam	SL or CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
	12 +	Sandstone bedrock								
9 Etown-Angostura										
Etown	0-9	Stony loam	GM	A-4	15 to 25	75-85	70-85	35-65	0.63-2.00	Low
	9-18	Stony clay loam	GM or GC	A-4 or A-6	25 to 40	60-70	60-70	45-55	0.20-0.63	Moderate
	18-60	Very stony clay loam	GM	A-4 or A-2	50 to 75	35-45	35-45	25-35	0.63-2.00	Low
Angostura	0-12	Gravelly sandy loam	GM or GC	A-4	15 to 35	65-80	65-80	25-40	0.63-2.00	Low
	12-54	Stony sandy clay loam	GM	A-4	35 to 50	55-65	55-65	20-35	0.63-2.00	Low to moderate
	54-70	Stony sandy loam	GM	A-2	50 to 75	35-45	35-45	10-20	2.00-6.30	Low
Loberg-like	0-10	Stony loam	GM	A-4	15 to 30	75-85	70-85	35-65	0.63-2.00	Low
	10-20	Stony clay loam	GM or GC	A-4 or A-1	25 to 40	60-70	60-70	45-55	0.20-0.63	Moderate
	20-60	Very stony clay loam	GM	A-4 or A-2	40 to 75	35-45	35-45	25-35	0.63-2.00	Low
10 Chimayo-Mirabel-Supervisor										
Chimayo	0-6	Stony loam	ML	A-4	15 to 25	90-100	75-85	35-45	0.63-2.00	Low
	6-18	Cobbly loam	ML	A-4	25 to 35	85-95	60-85	30-45	2.00-6.30	Low
Mirabal	0-18	Very stony loam	SM	A-1-b	40 to 70	70-95	65-90	20-35	2.00-6.30	Low
Supervisor	0-10	Gravelly sandy loam	SM	A-1-b	5 to 15	90-100	75-85	25-35	2.00-6.30	Low
	10-23	Very gravelly loamy sand	GM	A-1-b	5 to 15	80-90	55-65	10-20	>6.30	Low
11 Nambe-Cundiyo										
Nambe	0-8	Gravelly loam	ML	A-4	5 to 15	80-90	60-70	40-50	0.63-2.00	Low
	8-60	Gravelly sandy loam	SM	A-2	25 to 35	85-95	65-75	20-30	2.00-6.30	Low
Cundiyo	0-6	Gravelly sandy loam	SM	A-2	0 to 5	85-95	75-85	25-35	2.00-6.30	Low
	6-20	Sandy loam	SM	A-2	20 to 30	95-100	90-100	30-35	2.00-6.30	Low
	20-33	Gravelly sandy loam	SM	A-2	20 to 30	95-100	90-100	30-35	2.00-6.30	Low
	33-60	Gravelly sandy loam	SM	A-2	25 to 35	75-85	60-75	20-30	2.00-6.30	Low

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	inches				percent					
12 Hagerman-Penistaja-Travessilla										
Hagerman	0-5	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low
. . . . . .	5-30	Sandy clay loam	CL	A-6		100	100	50-70	0.63-2.00	Low to moderate
. . . . . .	30 +	Sandstone bedrock								
Penistaja	0-3	Fine sandy loam	ML	A-4		100	100	45-60	2.00-6.30	Low
. . . . . .	3-30	Sandy clay loam	CL	A-6		100	100	50-75	0.63-2.00	Low to moderate
. . . . . .	30-60	Very fine sandy loam	ML	A-4		100	100	50-65	0.63-2.00	Low
Travessilla	0-10	Fine sandy loam	SM or ML	A-4 or A-2	5 to 15	85-95	75-90	25-50	2.00-6.3	Low
13 La Porte-Rock Land-Bernal										
La Porte	0-9	Stony loam	SM or ML	A-4		50-70*	45-65*	35-50*	0.63-2.00	Low
. . . . . .	9 +	Limestone bedrock								
Rock land	(a miscellaneous land type - no estimates made)									
Bernal	0-3	Fine sandy loam	ML or SM	A-4		100	100	50-75	0.63-2.00	Low
. . . . . .	3-12	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
. . . . . .	12 +	Sandstone bedrock								
Deama	0-9	Stony loam	SM	A-4		50-70*	45-65*	35-50*	0.63-2.00	Low
Travessilla	(See Association 12)									
14 Penistaja-Tapia-La Fonda										
Penistaja	0-3	Fine sandy loam	ML	A-4		100	100	45-60	2.00-6.30	Low
. . . . . .	3-30	Sandy clay loam	CL	A-6		100	100	50-75	0.63-2.00	Low to moderate
. . . . . .	30-60	Very fine sandy loam	ML	A-4		100	100	50-65	0.63-2.00	Low
Tapia	0-5	Loam	ML	A-4		100	100	60-80	0.63-2.00	Low
. . . . . .	5-28	Clay loam	CL	A-6		95-100	95-100	70-85	0.63-2.00	Moderate
. . . . . .	28 +	Indurated caliche								
La Fonda	0-9	Loam	ML	A-4		100	100	60-85	0.63-2.00	Low
. . . . . .	9-22	Heavy loam	CL	A-6		100	100	85-95	0.63-2.00	Low to moderate
. . . . . .	22-60	Loam	ML or CL	A-4 or A-6		95-100	95-100	60-95	0.63-2.00	Low
Dean	0-9	Loam	ML	A-4		95-100	95-100	60-75	0.63-2.00	Low
. . . . . .	9-36	Very gravelly loam	GM	A-2		50-60	25-50	20-30	0.63-2.00	Low

*Fragments larger than 3 inches in estimates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R. 9 E.
R. 10 E.
R. 11 E.
RIO ARRIBA COUNTY
LOS ALAMOS CO
LOS ALAMOS COUNTY
SANDOVAL COUNTY
BERNALILLO
TORRANCE COUNTY
SAN MIGUEL COUNTY
MORA COUNTY
SANTA FE NATIONAL FOREST
SAN ILDEFONSO INDIAN RES
NAMBE INDIAN RES
SANTA FE (state capital)
ORTIZ MOUNTAIN
ORTIZ MOUNTAINS
SAN PEDRO MOUNTAINS
SANGRE DE CRISTO MOUNTAINS
Thompson Peak
Santa Cruz
Cundiyo
San Ildefonso Pueblo
Pojoaque
Tesuque Pueblo
Cuyamungue
Tesuque
Agua Fria
La Cienega
Glorieta
Lamy
Cerrillos
Madrid
Galisteo
San Cristobal
Golden
Stanley
Edgewood
Old Lake Estancia
Rio Grande
Santa Fe River
Galisteo Creek
Arroyo Hondo
Cañada de los Alamos
Pecos

SOIL ASSOCIATIONS *

SOILS OF RECENT ALLUVIAL VALLEYS

1	El Rancho-Fruitland association: Level to gently sloping, deep, loamy soils; on terraces and alluvial fans

SOILS OF DISSECTED PIEDMONT PLAINS

2	Pojoaque-Rough broken land association: Moderately sloping to moderately steep, deep, loamy and gravelly soils; on upland terraces and Rough broken land
3	Las Lucas-Pojoaque association: Nearly level to hilly, deep, loamy and gravelly soils; on uplands and dissected, eroded terraces
4	Panky-Pojoaque-Harvey association: Level to hilly, deep, loamy to clayey soils; on old alluvial fans and dissected, eroded terraces
5	Witt-Harvey-Clovis association: Level to moderately sloping, deep, loamy soils; on old alluvial fans in uplands of the Estancia Valley
6	Harvey-Dean-Tapia association: Nearly level to moderately sloping, loamy soils that are shallow to soft caliche and deep, loamy soils; on uplands

SOILS OF MESAS, CINDER CONES, AND BASALT FLOWS

7	Majada-Calabasas-Apache association: Level to steep, deep to shallow, loamy and very cobbly soils; on old basalt flows and cinder cones
8	Travessilla-Rock outcrop-Bernal association: Nearly level to moderately steep, shallow to very shallow, loamy soils and Rock outcrop; on mesas

SOILS OF OLD LAKE BASINS

9	La Brier-Willard association: Level to nearly level, deep, loamy to clayey soils; on alluvial fans and old lake benches

SOILS OF THE SANGRE DE CRISTO AND ORTIZ MOUNTAINS AND FOOTHILLS

10	Laporte-Witt association: Level to moderately steep, shallow to deep, loamy soils; on low foothills and alluvial fans
11	Rednun-Pena-Stony rock land association: Nearly level to moderately steep, deep, loamy to clayey and very gravelly soils; on uplands and alluvial fans; and steep to very steep, stony rock land; on foothills and mountain foot slopes
12	Chimayo-Mirabal-Supervisor association: Moderately sloping to very steep, shallow to moderately deep, loamy and very gravelly or very stony soils; on mountain foot slopes
13	Nambe-Cundiyo association: Moderately steep to very steep, deep, loamy and very cobbly or very stony soils; on mountains

* Texture terms used in descriptive heading of an association refer to dominant texture of the subsoil or texture of a significant thickness of soil material below the surface layer.

Compiled 1973

N

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

SANTA FE AREA, NEW MEXICO

Scale 1:316,800
1 0 1 2 3 4 5 Miles

Each area outlined on this map consists of

6

Soils of Recent Alluvial Valleys

Nearly all of the soils in the Santa Fe Area that are surface irrigated are in alluvial valleys along the major streams. The Santa Cruz Reservoir on the Santa Cruz River is the only water-storage reservoir in the Area used principally for irrigation. Water is diverted directly into irrigation ditches from such other streams as the Pojoaque River, Rio Tesuque, and Cienega Creek. Irrigation water is scant in dry years.

Along most of the streams the high-line irrigation ditch is much higher than the flood plain. Thus, only a small acreage of all the irrigated soils is subject to downstream flooding. Numerous side arroyos or intermittent drainageways that flow during rainstorms, however, cause considerable damage to irrigation structures and crops.

1. El Rancho-Fruitland association

Level to gently sloping, deep, loamy soils; on terraces and alluvial fans

This association consists of well-drained soils that formed in mixed alluvium from the Santa Fe Formation and in material derived from granitic rocks. It is in the northern part of the survey area. Slopes are 0 to 5 percent. The vegetation is mid grasses, except where the soils are irrigated. Elevation ranges from 5,800 to 6,200 feet. The mean annual precipitation is 12 to 14 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 160 to 170 days.

This association makes up about 2 percent of the survey area. About 40 percent of the association is El Rancho soils, and about 20 percent is Fruitland soils. Minor soils make up the remaining 40 percent, of which about half is Ancho soils and Bluewing soils on flood plains and terraces, and about half is Pojoaque soils, Riverwash, and Rough broken land.

El Rancho soils are on terraces generally apart from the flood plains. They have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown and light-brown sandy clay loam.

Fruitland soils are on alluvial fans, close to the channels where alluvial deposition has been relatively rapid. They have a surface layer of brown sandy clay loam or sandy loam. The substratum is light-brown fine sandy loam to a depth of 5 feet or more.

This association is used for irrigated crops and range, as wildlife habitat, and for water supply. Areas of Riverwash are used as a source for sand and gravel.

Farms average about 5 to 10 acres. Alfalfa and apples are the principal irrigated crops.

Wildlife on this association is mostly mourning dove and blue quail. A few of the irrigation reservoirs are stocked with fish, mostly trout.

In dry years the water supply is limited.

Soils of Dissected Piedmont Plains

These soils are in an area that extends from the northern end of the Santa Fe Area south to Torrance County. The area is a dissected piedmont plain about 12 miles wide. It is bounded on the east by the Sangre de Cristo Mountains and on the west by basalt flows. The soils in the northern part of this area formed in reworked material of the Santa Fe formation and those in the central part formed

in material weathered from shale. Those in the southern part formed in mixed alluvium. The area north of the city of Santa Fe is mostly Rough broken land, and it is dissected by many drainageways. The soils south of the city of Santa Fe are gently rolling. Nearly all of the soils are used for range.

2. Pojoaque-Rough broken land association

Moderately sloping to moderately steep, deep, loamy and gravelly soils; on upland terraces and Rough broken land

This association consists of well-drained soils and Rough broken land, a land type. It is in the northern part of the survey area. The soils formed in mixed alluvium of the Santa Fe formation. Slopes are 5 to 25 percent. Rough broken land is hilly to very steep. The vegetation is mid grasses, shrubs, and pinyon and juniper. Elevation ranges from 6,600 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 160 to 170 days.

This association makes up about 13 percent of the survey area. About 45 percent of the association is Pojoaque soils, and 45 percent is Rough broken land. Minor soils make up the remaining 10 percent, of which about half is Panky, Fivemile, and Bluewing soils, and about half is Riverwash and Badland.

The Pojoaque soils are intermingled with the Rough broken land. They are in places where the soils have become somewhat stabilized, generally on the ridgetops between drainageways. Pojoaque soils have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

Rough broken land is very shallow to sandstone, siltstone, and shale.

This association is used for range, as wildlife habitat, and for community development and water supply.

Ranches are large, carrying capacities are low, and water supplies are limited. Stock tanks supply most of the water. Livestock is mainly cattle.

Runoff is mostly from Pojoaque soils and Rough broken land. In places growth of pinyon and juniper is controlled mechanically. Maintaining maximum cover on range helps to minimize the hazard of erosion.

Wildlife on this association is mourning dove and quail.

3. Las Lucas-Pojoaque association

Nearly level to hilly, deep, loamy and gravelly soils; on uplands and dissected, eroded terraces

This association consists of well-drained soils that formed in material weathered from shale and in old alluvium of the Santa Fe formation that has been reworked by water. It is in the south-central part of the survey area. Slopes are 1 to 25 percent. The vegetation is mid grasses and scattered pinyon and juniper. Elevation ranges from 6,200 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 160 to 170 days.

This association makes up about 7 percent of the survey area. About 30 percent of the association is Las Lucas soils, and about 30 percent is Pojoaque soils. Minor soils make up the remaining 40 percent, of which about half is Galisteo, Travessilla, Bernal, and Persayo soils, and about half is Rough broken land, Shale rock land, Gullied land, Alluvial land, saline, and Rock Outcrop.

Las Lucas soils are nearly level to moderately sloping. These soils are on uplands. They have a surface layer of brown heavy loam and a subsoil of pale-brown and light yellowish-brown clay loam.

Pojoaque soils are on upland terraces. They are gently rolling to hilly and are on the breaks of drainageways. Pojoaque soils have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

These soils are used for range, as wildlife habitat, and for water supply. Livestock is mainly cattle.

Ranches are large, carrying capacities are low, and water supplies are limited. Stock tanks supply most of the water.

Wildlife on this association is deer, quail, and mourning dove. Indian artifacts are in scattered places throughout this association.

4. Panky-Pojoaque-Harvey association

Level to hilly, deep, loamy to clayey soils; on old alluvial fans and dissected, eroded terraces

This association consists of well-drained soils that formed in old mixed alluvium. It is in the central part of the survey area. Slopes are 0 to 25 percent. The vegetation is mid grasses and scattered pinyon and juniper. Elevation ranges from 6,200 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 130 to 170 days.

This association makes up about 13 percent of the survey area. About 35 percent of the association is Panky soils, about 25 percent is Pojoaque soils, and about 20 percent is Harvey soils. The minor Cerrillos, Agua Fria, Silver, Fivemile, Santa Fe, and La Fonda soils make up the remaining 20 percent.

Panky soils are level to moderately sloping and are on broad uplands between drainageways. They have a surface layer of light-brown fine sandy loam and a subsoil of reddish-brown loam and heavy clay loam. The substratum is pinkish-white sandy clay loam.

Pojoaque soils are gently rolling to hilly and are on breaks bordering drainageways (fig. 2). They have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

Harvey soils are nearly level to moderately sloping and are on sides of drainageways. They have a surface layer of brown loam and light-brown sandy clay loam over a layer of brown clay loam. The substratum is pink and light reddish-brown sandy clay loam and clay loam.

This association is used for range, as wildlife habitat, and for water supply. Most grazing is by cattle.

Ranches are large, carrying capacities are moderate, and water supplies are adequate. The water is generally kept in stock tanks and is pumped by windmills or is kept in ranch ponds (earthen dams) and comes from runoff.

Runoff is largely from the Pojoaque soils. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly mourning dove and blue quail.

in material weathered from shale. Those in the southern part formed in mixed alluvium. The area north of the city of Santa Fe is mostly Rough broken land, and it is dissected by many drainageways. The soils south of the city of Santa Fe are gently rolling. Nearly all of the soils are used for range.

2. *Pojoaque-Rough broken land association*

Moderately sloping to moderately steep, deep, loamy and gravelly soils; on upland terraces and Rough broken land

This association consists of well-drained soils and Rough broken land, a land type. It is in the northern part of the survey area. The soils formed in mixed alluvium of the Santa Fe formation. Slopes are 5 to 25 percent. Rough broken land is hilly to very steep. The vegetation is mid grasses, shrubs, and pinyon and juniper. Elevation ranges from 6,800 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 160 to 170 days.

This association makes up about 18 percent of the survey area. About 45 percent of the association is Pojoaque soils, and 45 percent is Rough broken land. Minor soils make up the remaining 10 percent, of which about half is Panky, [illegible], and [illegible] soils, and about half is Riverwash and Badland.

The Pojoaque soils are intermingled with the Rough broken land. They are in places where the soils have become somewhat stabilized, generally on the ridgetops between drainageways. Pojoaque soils have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

Rough broken land is very shallow to sandstone, siltstone, and shale.

This association is used for range, as wildlife habitat, and for community development and water supply.

Ranches are large, carrying capacities are low, and water supplies are limited. Stock tanks supply most of the water. Livestock is mainly cattle.

Runoff is mostly from Pojoaque soils and Rough broken land. In places growth of pinyon and juniper is controlled mechanically. Maintaining maximum cover on range helps to minimize the hazard of erosion.

Wildlife on this association is mourning dove and quail.

3. *Las Lucas-Pojoaque association*

Nearly level to hilly, deep, loamy and gravelly soils; on uplands and dissected, eroded terraces

This association consists of well-drained soils that formed in material weathered from shale and in old alluvium of the Santa Fe formation that has been reworked by water. It is in the south-central part of the survey area. Slopes are 1 to 25 percent. The vegetation is mid grasses and scattered pinyon and juniper. Elevation ranges from 6,200 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 160 to 170 days.

This association makes up about 7 percent of the survey area. About 30 percent of the association is Las Lucas soils, and about 30 percent is Pojoaque soils. Minor soils make up the remaining 40 percent, of which about half is Galisteo, Travessilla, Bernal, and Fernayo soils, and about half is Rough broken land, Shale rock land, Gullied land, Alluvial land, saline, and Rock Outcrop.

Las Lucas soils are nearly level to moderately sloping. These soils are on uplands. They have a surface layer of brown heavy loam and a subsoil of pale-brown and light yellowish-brown clay loam.

Pojoaque soils are on upland terraces. They are gently rolling to hilly and are on the breaks of drainageways. Pojoaque soils have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

These soils are used for range, as wildlife habitat, and for water supply. Livestock is mainly cattle.

Ranches are large, carrying capacities are low, and water supplies are limited. Stock tanks supply most of the water.

Wildlife on this association is deer, quail, and mourning dove. Indian artifacts are in scattered places throughout this association.

4. *Panky-Pojoaque-Harvey association*

Level to hilly, deep, loamy to clayey soils; on old alluvial fans and dissected, eroded terraces

This association consists of well-drained soils that formed in old mixed alluvium. It is in the central part of the survey area. Slopes are 0 to 25 percent. The vegetation is mid grasses and scattered pinyon and juniper. Elevation ranges from 6,200 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 150 to 170 days.

This association makes up about 15 percent of the survey area. About 35 percent of the association is Panky soils, about 25 percent is Pojoaque soils, and about 20 percent is Harvey soils. The minor Cerrillos, Agua Fria, Silver, [illegible], Santa Fe, and La Fonda soils make up the remaining 20 percent.

Panky soils are level to moderately sloping and are on broad uplands between drainageways. They have a surface layer of light-brown fine sandy loam and a subsoil of reddish-brown loam and heavy clay loam. The substratum is pinkish-white sandy clay loam.

Pojoaque soils are gently rolling to hilly and are on breaks bordering drainageways (fig. 2). They have a surface layer of light reddish-brown sandy clay loam over layers of light reddish-brown gravelly sandy clay loam and sandy clay loam.

Harvey soils are nearly level to moderately sloping and are on sides of drainageways. They have a surface layer of brown loam and light-brown sandy clay loam over a layer of brown clay loam. The substratum is pink and light reddish-brown sandy clay loam and clay loam.

This association is used for range, as wildlife habitat, and for water supply. Most grazing is by cattle.

Ranches are large; carrying capacities are moderate, and water supplies are adequate. The water is generally kept in stock tanks and is pumped by windmills or is kept in ranch ponds (earthen dams) and comes from runoff.

Runoff is largely from the Pojoaque soils. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly mourning dove and blue quail.

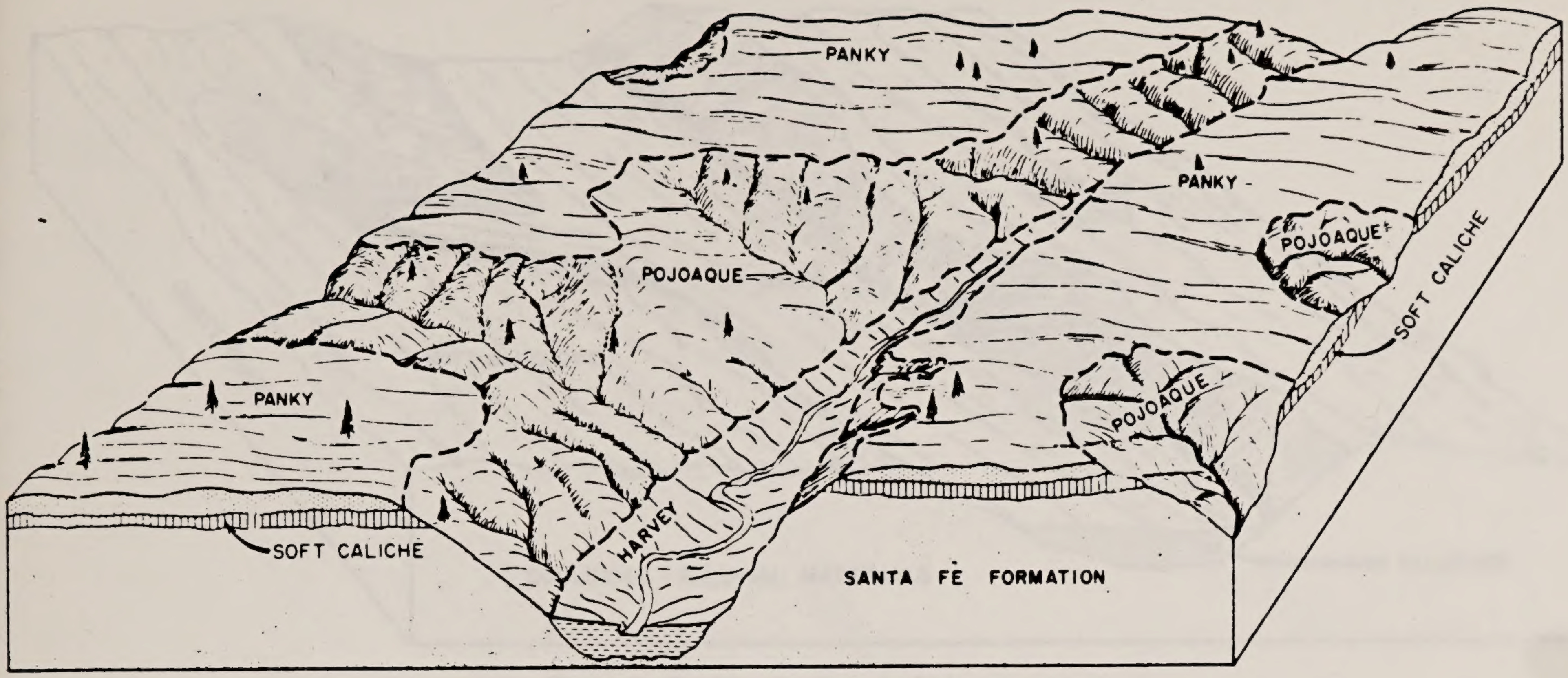


Figure 2.—**Pattern of soils typical of association 4.**

5. *Witt-Harvey-Clovis association*

Level to moderately sloping, deep, loamy soils; on old alluvial fans in uplands of the Estancia Valley

This association consists of well-drained soils that formed in old mixed alluvium. It is in the southern part of the survey area. Slopes are 0 to 9 percent. The vegetation is mid grasses. Elevation ranges from 6,200 to 6,600 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 130 to 170 days.

This association makes up about 11 percent of the survey area. About 50 percent of the association is Witt soils, about 30 percent is Harvey soils, and about 15 percent is Clovis soils. The minor La Brier, Penistaja, and Dean soils make up the remaining 5 percent.

Witt soils are on broad uplands between drainageways. They have a surface layer of brown loam and a subsoil of reddish-brown clay loam and yellowish-red sandy clay loam. The substratum is pinkish-white loam.

Harvey soils are nearly level to moderately sloping and are on sides of drainageways (fig. 3). They have a surface layer of brown loam and light-brown sandy clay loam over a layer of brown clay loam. The substratum is pink and light reddish-brown clay loam and sandy clay loam.

Clovis soils are on broad uplands between drainageways. They have a surface layer of brown loam and a subsoil of reddish-brown, brown, and light-brown sandy clay loam and clay loam. The substratum is light-brown sandy clay loam and pinkish-white fine sandy loam.

All of the soils of this association are used for grazing cattle. Some areas are also used as wildlife habitat, for water supply, and, to a limited extent, for irrigated and dryland farming.

Ranches are small, carrying capacities are moderate, and water supplies are adequate. Windmills supply most of the water. Dryfarming has greatly declined, and what little is left is mostly small grain grown mainly on Witt and Clovis loams along the Torrance County line. Irrigated crops are corn silage, alfalfa, small grain, and potatoes.

The hazard of soil blowing is moderate in dryfarmed areas and in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices on dryfarmed and irrigated cropland help to minimize the hazard of soil blowing.

Wildlife is mostly mourning dove, rabbits, and blue quail.

6. *Harvey-Dean-Tapia association*

Nearly level to moderately sloping, loamy soils that are shallow to soft caliche and deep, loamy soils; on uplands

This association consists of well-drained soils that formed in mixed alluvium. It is in the southeastern part of the survey area. Slopes are 1 to 9 percent. The vegetation is mid grasses and a few scattered pinyon and juniper. Elevation ranges from 6,200 to 6,600 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 130 to 170 days.

This association makes up about 9 percent of the survey area. About 30 percent of the association is Harvey soils, about 25 percent is Dean soils, and about 15 percent is Tapia soils. The minor Penistaja, Pastura, Otero, Palma, and Hagerman soils make up the remaining 30 percent.

Harvey soils are on side slopes. They have a surface layer of brown loam and light-brown sandy clay loam over a layer of brown clay loam. The substratum is light reddish-brown and pink clay loam and sandy clay loam.

Dean soils are mostly on crests of uplands. They have a surface layer of brown loam over a layer of light-brown

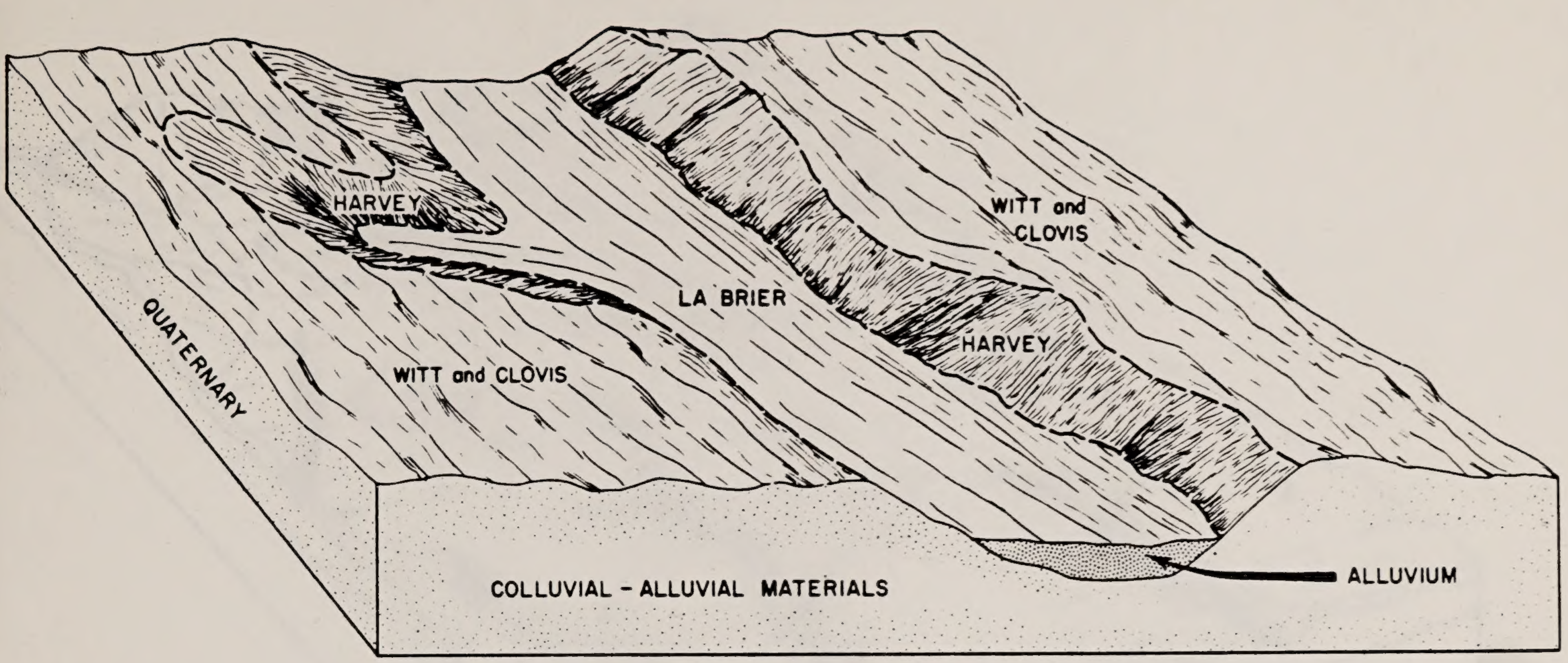


Figure 3.—**Pattern of soils typical of association 5.**

loam. The substratum is pink to very pale brown, very gravelly caliche.

Tapia soils are in broad, smooth areas between drainageways and depressions. They have a surface layer of brown loam and a subsoil of reddish-brown and light-brown clay loam. The substratum is pink gravelly loam.

Nearly all of these soils are used for grazing by cattle. Some areas are also used as wildlife habitat and for water supply.

Ranches are medium in size, carrying capacities are moderate, and water supplies are adequate. The water is generally kept in stock tanks and is pumped by windmills or is kept in ranch ponds (earthen dams) and comes from runoff.

The hazard of soil blowing is moderate in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of soil blowing.

Wildlife is mostly mourning dove, a few blue quail, and rabbits.

Soils of Mesas, Cinder Cones, and Basalt Flows

The soils of the mesas are very shallow to moderately deep over sandstone and limestone. They are in the east-central part of the survey area, mostly around Lamy.

The soils that formed on cinder cones and basalt flows are in the northwestern part of the Area. They are shallow to deep, and they are stony in places.

The soils in this group are used for grazing by cattle and as wildlife habitat.

7. *Majada-Calabasas-Apache association*

Level to steep, deep to shallow, loamy and very cobbly soils; on old basalt flows and cinder cones

This association consists of well-drained soils that formed in material weathered from basalt and other volcanic debris. It is in the northwestern part of the survey area. Slopes are 0 to 50 percent. The vegetation is pinyon and juniper, mid grasses, forbs, and shrubs. Elevation ranges from 6,400 to 7,200 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 140 to 170 days.

This association makes up about 8 percent of the survey area. About 25 percent of the association is Majada soils, about 25 percent is Calabasas soils, and about 15 percent is Apache soils. The minor Silver, Montoso, Los Alamos, and Guaje soils make up about 20 percent of this association, and Tuff rock land and Basalt rock land make up about 15 percent.

Majada soils are hilly to steep. They have a surface layer of grayish-brown fine sandy loam and dark grayish-brown cobbly fine sandy loam. The subsoil is dark grayish-brown and pale-brown very cobbly sandy clay loam and brown very cobbly sandy clay. The substratum is light-gray and white very cobbly loam.

Calabasas soils are level to moderately steep. These soils are around hills capped with Majada soils. Calabasas soils have a surface layer of brown loam and a subsoil of pinkish-gray heavy loam to light clay loam and light-brown heavy loam. The substratum is very pale brown and pinkish-white gravelly loam.

Apache soils are nearly level to strongly sloping (fig. 4) and are generally along drainageways and the front of basalt flows. They have a surface layer of brown stony fine sandy loam and a layer of light-brown sandy clay loam underlain, at a depth of 11 to 20 inches, by basalt.

Most of the acreage of this association is federally owned and is rangeland used for grazing cattle by permit. Some areas are also used as wildlife habitat, for water supply, and as a source for rock, pumice, and cinders useful in building and landscaping. The pinyon and juniper that grow on the association are a good source for firewood and fenceposts.

Water supplies are very limited in this association. Stock tanks and artificial collecting devices supply most of the water.

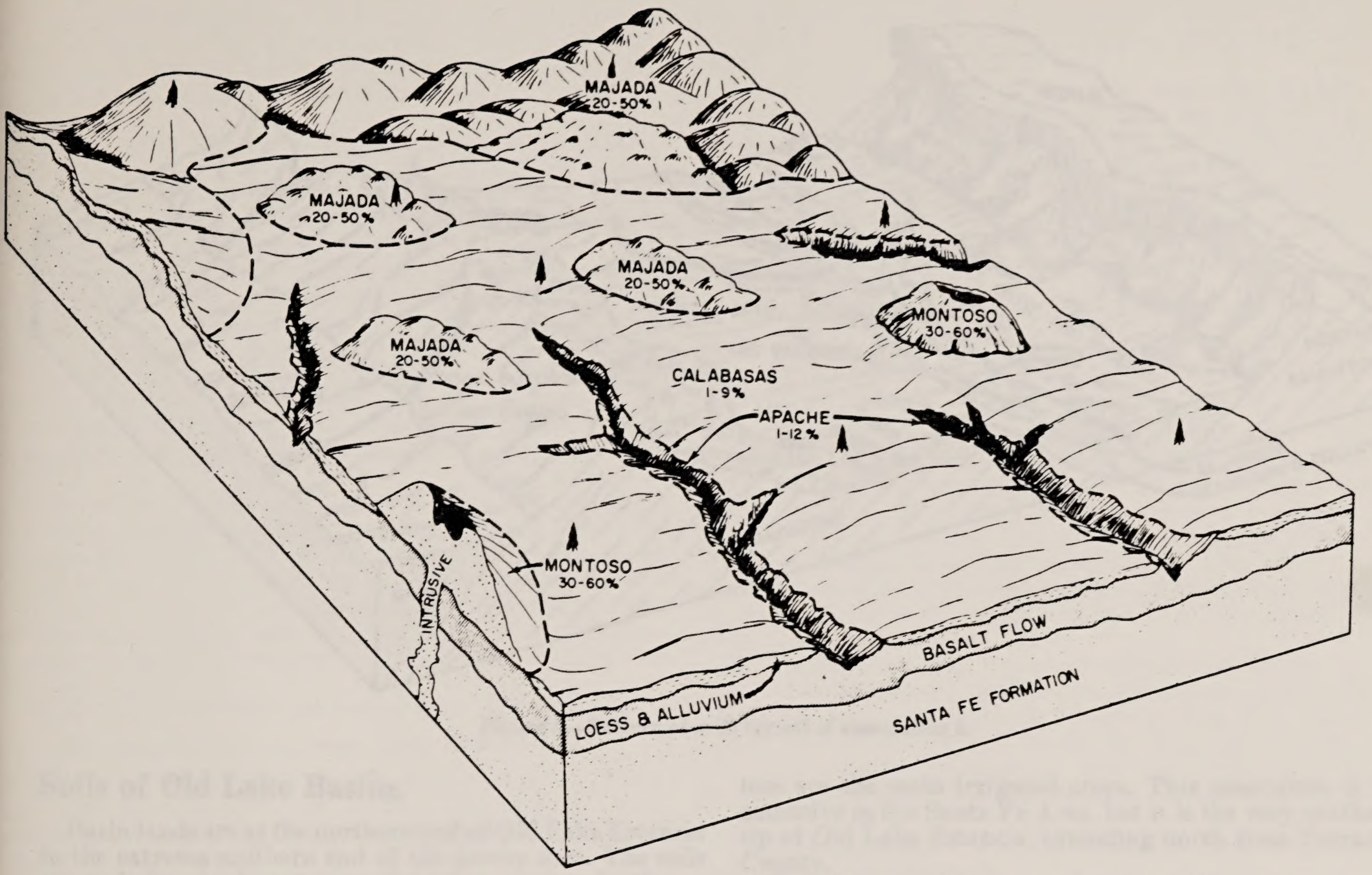


Figure 4.—**Pattern of soils typical of association 7.**

Runoff is largely from the Apache soils. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife on this association is mostly deer, blue quail, and mourning dove. Indian artifacts are in scattered places throughout the association.

8. *Travessilla-Rock outcrop-Bernal association*

Nearly level to moderately steep, shallow to very shallow, loamy soils and Rock outcrop; on mesas

This association consists of well-drained soils and Rock outcrop, a land type. The soils formed in material weathered from sandstone. Slopes are 1 to 25 percent. This association is mainly in the eastern part of the survey area. The vegetation is mid grasses, shrubs, forbs, pinyon, and juniper. Elevation ranges from 6,400 to 6,800 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 150 to 160 days.

This association makes up about 13 percent of the survey area. About 25 percent of the association is Travessilla soils, about 20 percent is Rock outcrop, and about 15 percent is Bernal soils. The minor Prewitt, Rednun, Wilcoxson variant, Chimayo, Ortiz, Las Lucas, Cueva, and Encierro soils make up the remaining 40 percent.

Travessilla soils are nearly level to moderately steep and are generally near the edge of mesa tops and in benchlike areas of mesa fronts. They have a surface layer of reddish-brown loam over sandstone.

Rock outcrop is nearly level to very steep. It is intermingled with Travessilla soils and, to a limited extent, with Bernal soils.

Bernal soils are nearly level to gently sloping and are generally on mesa tops (fig. 5). They have a surface layer of brown fine sandy loam and a subsoil of reddish-brown very fine sandy loam and clay loam. Sandstone is at a depth of 8 to 20 inches.

All the soils are used for grazing by cattle. Some areas are also used as wildlife habitat and for water supply. The pinyon and juniper of this association are a good source for firewood and fence posts.

Ranches are large, carrying capacities are low, and water supply is limited. Stock tanks supply most of the water.

Runoff is largely from the Rock outcrop. The hazard of water erosion is moderate in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly deer, mourning dove, and a limited number of blue quail and turkey. Indian artifacts are present in scattered places throughout the association.

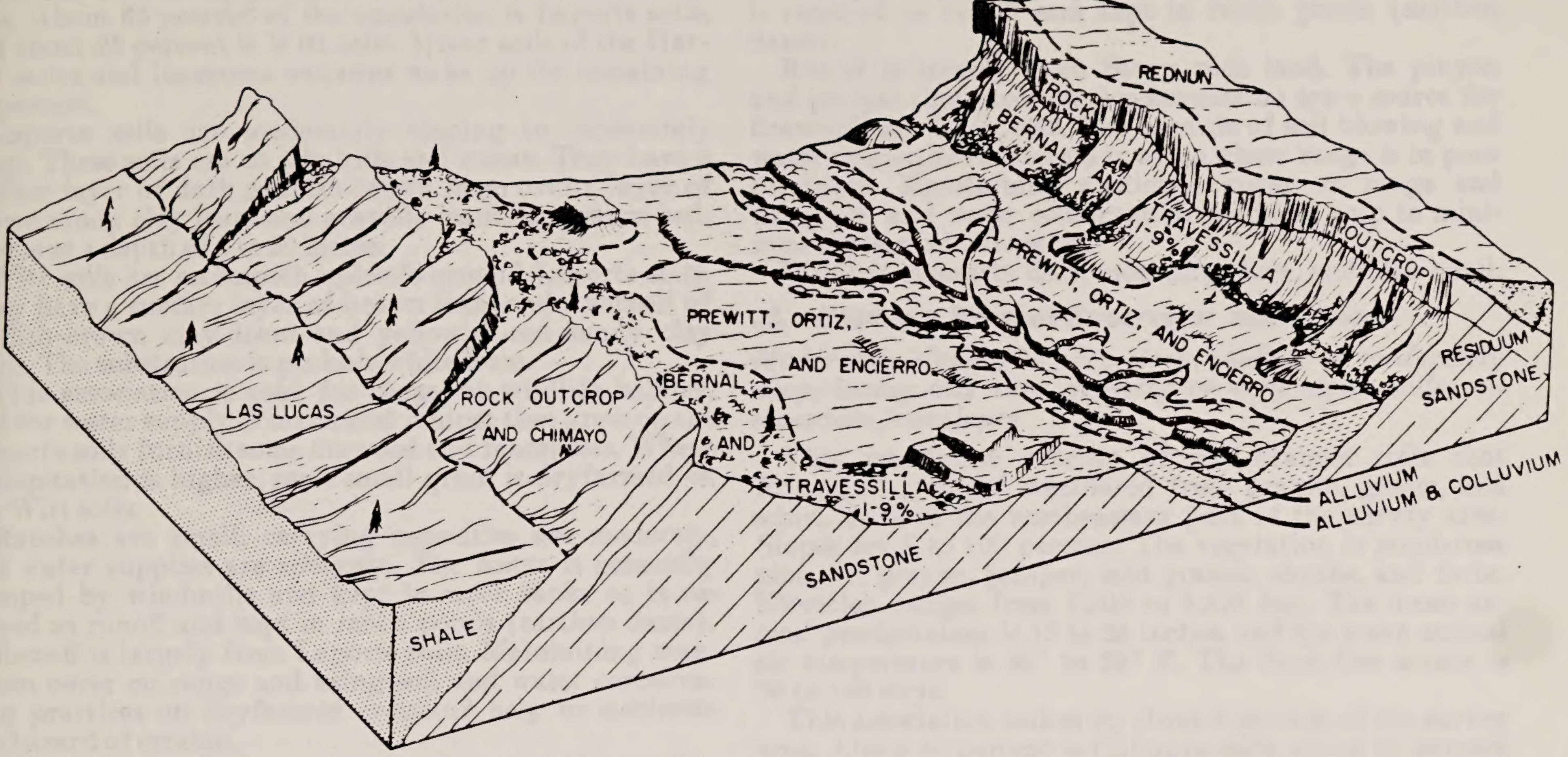


Figure 5.—Pattern of soils typical of association 8.

Soils of Old Lake Basins

Basin lands are at the northern end of Old Lake Estancia in the extreme southern end of the survey area. The soils are underlain by lacustrine sediment at varying depths.

9. La Brier-Willard association

Level to nearly level, deep, loamy to clayey soils; on alluvial fans and old lake benches

This association consists of well-drained soils that formed in mixed alluvium and lake sediment. It is in the southern part of the survey area. Slopes are 0 to 3 percent. The vegetation is mid grasses, forbs, and shrubs. Elevation ranges from 6,200 to 6,600 feet. The mean annual precipitation is 12 to 14 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 130 to 140 days.

This association makes up about 1 percent of the survey area. About 70 percent of the association is La Brier soils, and about 15 percent is Willard soils. The minor Moriarty, Penistaja, Harvey, and Witt soils make up the remaining 15 percent.

La Brier soils are on alluvial fans of drainageways that empty into the lake depression. They have a surface layer of brown loam and a subsoil and substratum of dark reddish-gray clay loam.

Willard soils are level and nearly level and are in areas adjacent to the extreme north end of Old Lake Estancia. They have a surface layer of brown loam and a subsoil of pink light clay loam. The substratum is very pale brown clay loam.

These soils are used for grazing by cattle. Some areas are also used as wildlife habitat, for water supply, and, to a limited extent, for irrigated farming. Alfalfa and potatoes are the main irrigated crops. This association is inextensive in the Sante Fe Area, but it is the very northern tip of Old Lake Estancia, extending north from Torrance County.

Carrying capacities are moderate to high, and water supplies are adequate. Windmills supply most of the water.

The hazard of soil blowing is moderate in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of soil blowing.

Wildlife is mostly rabbits, mourning dove, and blue quail.

Soils of the Sangre de Cristo and Ortiz Mountains and Foothills

Some of the soils in this group are in an area about 10 miles wide and 30 miles long in the Sangre de Cristo Mountains in the northeastern part of the survey area. They formed mostly in material weathered from granite, gneiss, and schist. The rest of the soils are in an area of about 16 square miles in the Ortiz and San Pedro Mountains near Golden in the southwestern part of the county. They also formed in granitic material.

10. Laporte-Witt association

Level to moderately steep, shallow to deep, loamy soils; on low foothills and alluvial fans

This association consists of well-drained soils that formed in material weathered from limestone and in old mixed alluvium. It is in the southwestern corner of the survey area. Slopes are 0 to 25 percent. The vegetation is mid grasses, forbs, shrubs, pinyon, and juniper. Elevation ranges from 6,200 to 6,800 feet. The mean annual precipita-

tion is 12 to 14 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 130 to 160 days.

This association makes up about 1 percent of the survey area. About 65 percent of the association is Laporte soils, and about 25 percent is Witt soils. Minor soils of the Harvey series and limestone outcrops make up the remaining 10 percent.

Laporte soils are moderately sloping to moderately steep. These soils are on low hills and mesas. They have a surface layer of dark grayish-brown loam over a layer of brown sandy clay loam and gravelly loam. Limestone bedrock is at a depth of 8 to 20 inches.

Witt soils are on smooth uplands around Laporte soils. They have a surface layer of brown loam and a subsoil of reddish-brown clay loam and yellowish-red sandy clay loam. The substratum is pinkish-white loam.

This association is used for range, as wildlife habitat, and for water supply. Pinyon and juniper that grow on the Laporte soils furnish some firewood and fenceposts. Where precipitation is higher, some small grain is dryfarmed on the Witt soils.

Ranches are small, carrying capacities are moderate, and water supplies are adequate. The water is generally pumped by windmills and kept in stock tanks or is received as runoff and kept in ranch ponds (earthen dams).

Runoff is largely from Laporte soils. Maintaining maximum cover on range and using soil and water conservation practices on dryfarmed cropland help to minimize the hazard of erosion.

Wildlife is mostly deer, mourning dove, and blue quail.

11. Rednun-Pena-Stony rock land association

Nearly level to moderately steep, deep, loamy to clayey and very gravelly soils; on uplands and alluvial fans; and steep to very steep, stony rock land; on foothills and mountain foot slopes

This association consists of well-drained soils and the land type Stony rock land. It is in the southwestern part of the survey area. The soils formed in mixed alluvium. The soils have slopes of 1 to 25 percent. Stony rock land has slopes of 20 to 100 percent. The vegetation is mid grasses, pinyon, and juniper. Elevation ranges from 6,600 to 7,000 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 150 to 160 days.

This association makes up about 5 percent of the survey area. About 50 percent of the association is Rednun soils, about 25 percent is Pena soils, and 15 percent is Stony rock land. Minor soils of the Cerrillos, Travessilla, and Panky series make up the remaining 10 percent.

Rednun soils are nearly level to moderately sloping. They are in smooth areas between drainageways and depressions. These soils have a surface layer of reddish-brown loam and a subsoil of brown and dark-brown heavy clay loam. The substratum is dark-brown clay loam and very fine sandy clay loam.

Pena soils are nearly level to moderately steep, and they generally border drainageways. They have a surface layer of dark reddish-brown stony clay loam over pinkish-gray very gravelly clay loam and very gravelly loam.

Stony rock land is steep to very steep. It is on hills and side slopes.

The soils of this association are used for grazing cattle, as wildlife habitat, and for water supply.

Ranches are large, carrying capacities are moderate, and water supplies are somewhat limited. The water is generally pumped by windmills and kept in stock tanks or is received as runoff and kept in ranch ponds (earthen dams).

Runoff is largely from Stony rock land. The pinyon and juniper that grow on this association are a source for firewood and fenceposts. The hazards of soil blowing and water erosion are moderate in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly deer, mourning dove, and blue quail.

12. Chimayo-Mirabal-Supervisor association

Moderately sloping to very steep, shallow to moderately deep, loamy and very gravelly or very stony soils; on mountain foot slopes

This association consists of well-drained soils that formed in material weathered from granite, gneiss, and schist. It is in the northeastern part of the survey area. Slopes are 5 to 100 percent. The vegetation is ponderosa pine, fir, pinyon, juniper, mid grasses, shrubs, and forbs. Elevation ranges from 7,500 to 9,500 feet. The mean annual precipitation is 15 to 24 inches, and the mean annual air temperature is 42° to 52° F. The frost-free season is 50 to 140 days.

This association makes up about 8 percent of the survey area. About 40 percent is Chimayo soils, about 35 percent is Mirabal soils, and about 20 percent is Supervisor soils. Minor soils of the Capillo, Santa Fe, Zuni, and Borrego series and the land types Stony rock land, Alluvial land, gravelly, and Rock outcrop make up the remaining 5 percent.

The Chimayo soils are at lower elevations than the Supervisor and Mirabal soils.

Chimayo soils have a surface layer of grayish-brown stony loam over a layer of light brownish-gray very stony loam. Granite, gneiss, or schist bedrock is at a depth of 12 to 20 inches.

Mirabal soils have a surface layer of dark grayish-brown stony loam over a layer of grayish-brown and brown very stony loam. Granite, gneiss, or schist bedrock is at a depth of 20 to 30 inches.

Supervisor soils have a surface layer of dark-gray and dark grayish-brown gravelly sandy loam over a layer of pale-brown very gravelly light sandy loam. Granite, gneiss, or schist bedrock is at a depth of 20 to 30 inches.

This association is used for timber production, for range, as wildlife habitat, and for water supply and recreation. The Chimayo soils and, to a very limited extent, the Mirabal and Supervisor soils are used for grazing cattle. These soils are mostly within the boundaries of the Santa Fe National Forest.

Water supplies in this association are limited to stock tanks, springs, and running streams.

Runoff is rapid on Chimayo, Mirabal, and Supervisor soils. The hazard of water erosion is moderate to severe in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly deer and turkey. Also, a few bears are present in places.

Ranches are large, carrying capacities are moderate, and water supplies are somewhat limited. The water is generally pumped by windmills and kept in stock tanks or is received as runoff and kept in ranch ponds (earthen dams).

Runoff is largely from Stony rock land. The pinyon and juniper that grow on this association are a source for firewood and fenceposts. The hazards of soil blowing and water erosion are moderate in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly deer, mourning dove, and blue quail.

12. *Chimayo-Mirabal-Supervisor association*

Moderately sloping to very steep, shallow to moderately deep, loamy and very gravelly or very stony soils; on mountain foot slopes

This association consists of well-drained soils that formed in material weathered from granite, gneiss, and schist. It is in the northeastern part of the survey area. Slopes are 5 to 100 percent. The vegetation is ponderosa pine, fir, pinyon, juniper, and grasses, shrubs, and forbs. Elevation ranges from 7,000 to 9,500 feet. The mean annual precipitation is 15 to 24 inches, and the mean annual air temperature is 42° to 52° F. The frost-free season is 90 to 140 days.

This association makes up about 8 percent of the survey area. About 40 percent is Chimayo soils, about 25 percent is Mirabal soils, and about 30 percent is Supervisor soils. Minor soils of the Capulin, Santa Fe, Zeni, and Borrego series and the land types Stony rock land, Alluvial land, gravelly, and Rock outcrop make up the remaining 5 percent.

The Chimayo soils are at lower elevations than the Supervisor and Mirabal soils.

Chimayo soils have a surface layer of grayish-brown stony loam over a layer of light brownish-gray very stony loam. Granite, gneiss, or schist bedrock is at a depth of 12 to 20 inches.

Mirabal soils have a surface layer of dark grayish-brown stony loam over a layer of grayish-brown and brown very stony loam. Granite, gneiss, or schist bedrock is at a depth of 20 to 30 inches.

Supervisor soils have a surface layer of dark-gray and dark grayish-brown gravelly sandy loam over a layer of pale-brown very gravelly light sandy loam. Granite, gneiss, or schist bedrock is at a depth of 20 to 30 inches.

This association is used for timber production, for range, as wildlife habitat, and for water supply and recreation. The Chimayo soils and, to a very limited extent, the Mirabal and Supervisor soils are used for grazing cattle. These soils are mostly within the boundaries of the Santa Fe National Forest.

Water supplies in this association are limited to stock tanks, springs, and running streams.

Runoff is rapid on Chimayo, Mirabal, and Supervisor soils. The hazard of water erosion is moderate to severe in areas where range is in poor condition. Maintaining maximum cover on range and using soil and water conservation practices help to minimize the hazard of erosion.

Wildlife is mostly deer and turkey. Also, a few bears are present in places.

ion is 12 to 14 inches, and the mean annual air temperature 45° to 52° F. The frost-free season is 130 to 160 days.

This association makes up about 1 percent of the survey rea. About 60 percent of the association is Laporte soils, nd about 25 percent is Witt soils. Minor soils of the Harvey series and limestone outcrops make up the remaining 0 percent.

Laporte soils are moderately sloping to moderately teep. These soils are on low hills and mesas. They have a urface layer of dark grayish-brown loam over a layer of brown sandy clay loam and gravelly loam. Limestone bedrock is at a depth of 8 to 20 inches.

Witt soils are on smooth uplands around Laporte soils. They have a surface layer of brown loam and a subsoil of reddish-brown clay loam and yellowish-red sandy clay loam. The substratum is pinkish-white loam.

This association is used for range, as wildlife habitat, and for water supply. Pinyon and juniper that grow on the Laporte soils furnish some firewood and fenceposts. Where precipitation is higher, some small grain is dryfarmed on the Witt soils.

Ranches are small, carrying capacities are moderate, and water supplies are adequate. The water is generally pumped by windmills and kept in stock tanks or is received as runoff and kept in ranch ponds (earthen dams).

Runoff is largely from Laporte soils. Maintaining maximum cover on range and using soil and water conservation practices on dryfarmed cropland help to minimize the hazard of erosion.

Wildlife is mostly deer, mourning dove, and blue quail.

11. *Rednun-Pena-Stony rock land association*

Nearly level to moderately steep, deep, loamy to clayey and very gravelly soils; on uplands and alluvial fans; and steep to very steep, stony rock land; on foothills and mountain foot slopes

This association consists of well-drained soils and the land type Stony rock land. It is in the southwestern part of the survey area. The soils formed in mixed alluvium. The soils have slopes of 1 to 25 percent. Stony rock land has slopes of 25 to 100 percent. The vegetation is mid grasses, pinyon, and juniper. Elevation ranges from 6,000 to 7,000 feet. The mean annual precipitation is 12 to 15 inches, and the mean annual air temperature is 48° to 52° F. The frost-free season is 150 to 180 days.

This association makes up about 3 percent of the survey area. About 50 percent of the association is Rednun soils, about 25 percent is Pena soils, and 15 percent is Stony rock land. Minor soils of the Cerrillos, Travessilla, and Pinon series make up the remaining 10 percent.

Rednun soils are nearly level to moderately sloping. They are in smooth areas between drainageways and depressions. These soils have a surface layer of reddish-brown loam and a subsoil of brown and dark-brown heavy clay loam. The substratum is dark-brown clay loam and very fine sandy clay loam.

Pena soils are nearly level to moderately steep, and they generally border drainageways. They have a surface layer of dark reddish-brown stony clay loam over pinkish-gray very gravelly clay loam and very gravelly loam.

Stony rock land is steep to very steep. It is on hills and side slopes.

The soils of this association are used for grazing cattle, as wildlife habitat, and for water supply.

13. Nambe-Cundiyo association

Moderately steep to very steep, deep, loamy and very cobbly or very stony soils; on mountains

This association consists of well-drained soils that formed in alluvium and glacial till from granite, gneiss, and schist. It is in the northeastern part of the survey area. Slopes are 20 to 100 percent. The vegetation is spruce, fir, aspen, and pine and a sparse understory of mid grasses and forbs. Elevation ranges from 9,200 to 12,000 feet. The mean annual precipitation is 26 to 40 inches, and the mean annual air temperature is 40° to 45° F. The frost-free season is 40 to 80 days.

This association makes up about 9 percent of the survey area. About 45 percent of the association is Nambe soils and 25 percent is Cundiyo soils. Minor soils of the Bobtail, Fortwingate variant, McVickers variant, Penitente, Lunch variant, and Adel series and the land types Alluvial land, cobbly, and Rock outcrop make up the remaining 30 percent.

Nambe soils are generally at higher elevations on the mountains. They have a surface layer of very dark grayish-brown gravelly loam and a subsurface layer of brown loam. The subsoil is brown, light stony to very stony sandy loam. The substratum is brown very stony sandy loam.

Cundiyo soils are at lower elevations on the mountains. They have a surface layer of pale-brown gravelly sandy loam and very cobbly sandy loam. The subsoil is very pale brown and light yellowish-brown very cobbly loam.

This association is used for timber production, as wildlife habitat, and for water supply and recreation. The soils are only in the Santa Fe National Forest.

Managing timber properly and using soil and water conservation practices help to minimize the hazard of erosion.

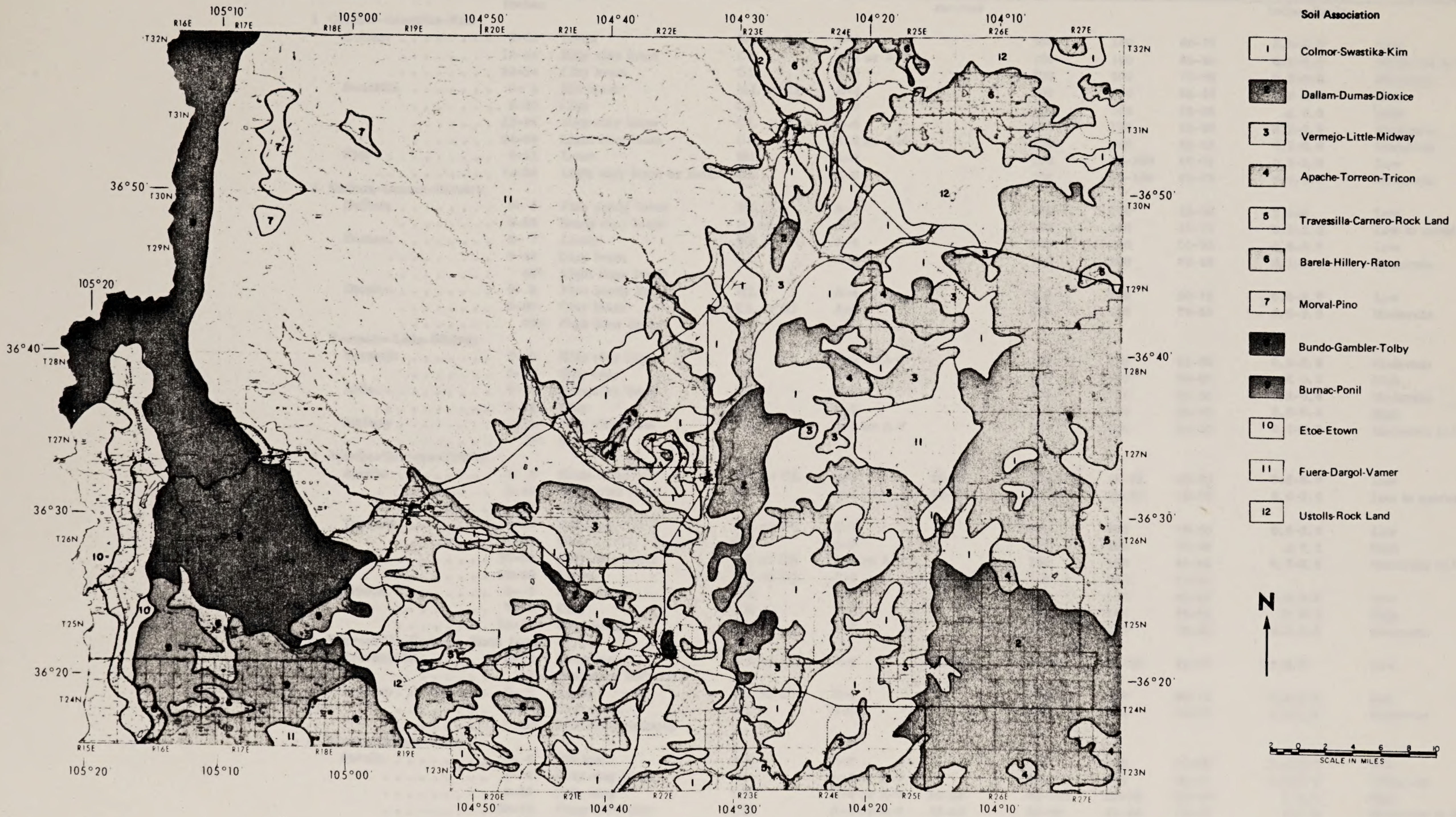
Wildlife is mostly deer, turkey, grouse, and elk.

Engineering soil groups and estimated soil properties, Santa Fe County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less than 3 Inches Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.								in/hr	
1 El Rancho-Fruitland										
El Rancho	0-60	Sandy clay loam	SC	A-6		100	100	35-50	0.63-2.00	Low to moderate
Fruitland	0-13	Sandy clay loam	SC	A-6		100	100	35-45	0.63-2.00	Low to moderate
	13-60	Fine sandy loam	SM	A2-4 or A4		100	100	25-50	2.00-6.30	Low
Pojoaque	(See association 2)									
Bluewing	0-4	Very gravelly sandy loam	GM	A-2		35-50	35-50	15-25	2.00-6.30	Low
	4-20	Gravelly loam	ML	A-4		90-100	75-85	25-35	2.00-6.30	Low
	20-60	Very gravelly fine sand	GM	A-1-b		35-50	25-50	5-10	> 6.30	Low
2 Pojoaque-Rough Broken Land										
Pojoaque	0-7	Sandy clay loam	SC	A-6		95-100	90-100	35-50	0.63-2.00	Low to moderate
	7-25	Gravelly sandy clay loam	SC or SM	A6 or A4		80-90	70-80	25-40	0.63-2.00	Low to moderate
	25-60	Sandy clay loam	SC	A-6		90-100	80-90	35-45	0.63-2.00	Low to moderate
Rough broken land	(Estimates not made)									
3 Las Lucas-Galisteo										
Las Lucas	0-5	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	5-50	Clay loam	CL	A-6		100	100	70-80	0.20-0.63	Moderate
Galisteo	0-6	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	6-60	Silty clay	CH	A-7		100	100	90-95	< 0.20	High
4 Panky-Pojoaque-Harvey										
Panky	0-4	Fine sandy loam	ML-CL	A-4		100	100	70-85	2.00-6.30	Low
	4-24	Clay loam	CL	A-6		100	100	75-90	0.20-0.63	Moderate to high
	24-60	Sandy clay loam (high lime)	ML-CL	A-4		100	100	50-60	0.63-2.00	Low to moderate
Pojoaque	(See association 2)									
Harvey	3-12	Sandy clay loam	ML or CL	A-4 or A-6		100	100	50-60	0.63-2.00	Low to moderate
	12-27	Clay loam	CL	A-6		100	100	70-80	0.63-2.00	Moderate
	27-60	Sandy clay loam	CL	A-6		100	100	50-60	0.63-2.00	Low to moderate
Five Mile	0-17	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	17-60	Silt loam	ML	A-4		100	100	70-90	0.20-0.63	Low
Cerrillos	0-5	Fine sandy loam	SM	A-4		100	100	40-50	2.00-6.30	Low
	5-30	Clay loam	CL	A-6 or A-7		100	100	75-85	0.20-0.63	Moderate
	30-60	Sandy clay loam	SC	A-6		100	100	40-50	0.63-2.00	Low to moderate
5 Witt-Harvey-Clovis										
Witt	0-8	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	8-23	Clay loam	CL	A-6		100	100	70-80	0.20-0.63	Moderate
	23-37	Sandy clay loam	CL	A-6		100	100	60-75	0.63-2.00	Moderate
	37-60	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low to moderate
Harvey	(See association 4)									
Clovis	0-4	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	4-29	Clay loam	CL	A-6		100	100	75-85	0.20-0.63	Moderate
	29-34	Sandy clay loam	SC	A-6		100	100	35-50	0.63-2.00	Low to moderate
	34-60	Sandy loam (high lime)	SM	A-2		100	100	25-50	2.00-6.30	Low

6 Harvey-Dean-Tapia										
Harvey	3-12	Sandy clay loam	ML or CL	A-4 or A-6		100	100	50-60	0.63-2.00	Low to moderate
. . . .	12-27	Clay loam	CL	A-6		100	100	70-80	0.63-2.00	Moderate
. . . .	27-60	Sandy clay loam	CL	A-6		100	100	50-60	0.63-2.00	Low to moderate
Dean	0-9	Loam	ML	A-4		95-100	95-100	60-75	0.63-2.00	Low
. . . .	9-36	Very gravelly loam	GM	A-2		50-60	25-50	20-30	2.00-6.30	Low
Tapia	0-4	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
. . . .	4-21	Light clay loam	CL	A-6		100	90-100	65-75	0.63-2.00	Moderate
. . . .	21+	Weakly to strongly cemented caliche gravel cobbles								
Penistaja	0-3	Fine sandy loam	ML	A-4		100	100	45-60	2.00-6.30	Low
. . . .	3-30	Sandy clay loam	CL	A-6		100	100	50-75	0.63-2.00	Low to moderate
. . . .	30-60	Very fine sandy loam	ML	A-4		100	100	50-65	0.63-2.00	Low
7 Majada-Calabasas-Apache										
Majada	0-7	Cobbly fine sandy loam	SM	A-4	15-25	95-100	90-100	40-50	2.00-6.30	Low
. . . .	7-14	Very cobbly sandy clay loam	SC	A-6	40-70	95-100	90-100	35-55	0.63-2.00	Low to moderate
. . . .	14-19	Very cobbly sandy clay	CH	A-7	40-70	95-100	95-100	75-95	< 0.20	Moderate
. . . .	19-30	Very cobbly sandy clay loam	SC	A-6	40-70	95-100	90-100	35-55	0.63-2.00	Low to moderate
. . . .	30-40	Very cobbly loam	ML-CL	A-4	65-70	95-100	90-100	60-75	0.63-2.00	Low
Calabasas	0-21	Loam	CL	A-6		100	100	75-90	0.63-2.00	Low to moderate
. . . .	21-32	Clay loam	CL	A-6		100	100	80-90	0.20-0.63	Moderate
. . . .	32-44	Heavy loam	CL	A-6		100	100	80-90	0.63-2.00	Moderate
. . . .	44-53	Loam	ML	A-4		100	100	65-80	0.63-2.00	Low
Apache	0-9	Stony fine sandy loam	SM	A-4	25-35	95-100	95-100	40-50	2.00-6.30	Low
. . . .	9-16	Stony loam	CL	A-6	10-20	95-100	90-100	50-60	0.63-2.00	Low to moderate
Silver	0-3	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
. . . .	3-14	Clay	CL or CH	A-6 or A-7		100	100	85-95	< 0.20	High
. . . .	14-45	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
. . . .	45-60	Loam	ML	A-6		100	100	80-90	0.63-2.00	Low to moderate
8 Travessilla-Rockland-Bernal										
Travessilla	0-10	Loam	ML	A-4		95-100	90-100	50-70	0.63-2.00	Low
Bernal	0-3	Fine sandy loam	SM	A-4		100	100	45-70	2.00-6.30	Low
. . . .	3-7	Very fine sandy loam	ML	A-4		100	100	65-85	0.63-2.00	Low
. . . .	7-18	Clay loam	CL	A-6		100	100	75-90	0.20-0.63	Moderate
Redmun	(See association 11)									
Prewitt	0-5	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
. . . .	5-35	Sandy clay loam	SC	A-6		100	100	50-70	0.63-2.00	Low to moderate
. . . .	35-50	Clay loam	CL	A-6 or A-7		100	100	70-80	0.20-0.63	Moderate
9 Willard-LaBrier										
Willard	0-10	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
. . . .	10-36	Clay loam	CL	A-6 or A-7		100	100	70-85	0.20-2.00	Moderate
LaBrier	3-60	Clay loam	CL	A-6 or A-7		100	100	70-80	0.20-0.63	Moderate to high
10 Laporte-Witt										
Laporte	0-7	Cobbly loam	ML	A-4	10-20	95-100	90-100	50-70	0.63-2.00	Low
. . . .	7-13	Cobbly sandy clay loam	CL	A-6 or A-4	10-20	95-100	90-100	45-65	0.63-2.00	Low
. . . .	13-19	Gravelly loam	ML	A-4		90-100	70-80	45-55	2.00-6.30	Low
Witt	(See association 5)									

		Classification				Percentage Less than 3 Inches Passing Sieve--				
Soil Map Symbol and Soil Association	Depth from Surface	USDA texture	Unified	AASHO	Coarse Fraction Greater than 3 Inches	No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)	Range in Permeability	Shrink-swell Potential
	in.								in/hr	
11 Rednun-Pena-Stony Land										
Rednun	0-7	Loam	ML	A-4		100	100	65-80	0.63-2.00	Low to moderate
. . . .	7-35	Clay loam	CL	A-6 or A-7		100	100	75-90	0.20-0.63	Moderate
. . . .	35-50	Sandy clay loam	CL	A-6		100	100	55-75	0.63-2.00	Low to moderate
Pena	0-13	Stony clay loam	CL or ML	A-6 or A-4	30-40	95-100	85-100	60-75	0.63-2.00	Low to moderate
. . . .	13-24	Very gravelly clay loam	GM	A-4	0-10	65-75	55-65	40-50	0.63-2.00	Low
. . . .	24-60	Very gravelly loam	GM	A-2	20-40	60-75	50-60	35-45	2.00-6.30	Low
12 Chimayo-Mirabal-Supervisor										
Chimayo	0-6	Stony loam	ML	A-4	15-25	90-100	75-85	35-45	0.63-2.00	Low
. . . .	6-18	Cobbly loam	ML	A-4	25-35	85-95	60-85	30-45	2.00-6.30	Low
Mirabal.	0-18	Very stony loam	SM	A-1-b	40-70	70-95	65-90	20-35	2.00-6.30	Low
Supervisor	0-10	Gravelly sandy loam	SM	A-1-b	5-15	90-100	75-85	25-35	2.00-6.30	Low
. . . .	10-23	Very gravelly loamy sand	GM	A-1-b	5-15	80-90	55-65	10-20	6.30	Low
13 Nambe-Cundiyo										
Nambe	0-8	Gravelly loam	ML	A-4	5-15	80-90	60-70	40-50	0.63-2.00	Low
. . . .	8-60	Gravelly sandy loam	SM	A-2	25-35	85-95	65-75	20-30	2.00-6.30	Low
Cundiyo.	0-6	Gravelly sandy loam	SM	A-2		85-95	75-85	25-35	2.00-6.30	Low
. . . .	6-20	Sandy loam	SM	A-2	20-30	95-100	90-100	30-35	2.00-6.30	Low
. . . .	20-33	Gravelly sandy loam	SM	A-2	20-30	95-100	90-100	30-35	2.00-6.30	Low
. . . .	33-60	Gravelly sandy loam	SM	A-2	25-35	75-85	65-75	20-30	2.00-6.30	Low



Soil Association
1 Colmor-Swastika-Kim
2 Dallam-Dumas-Dioxice
3 Vermejo-Little-Midway
4 Apache-Torreon-Tricon
5 Travessilla-Carnero-Rock Land
6 Barela-Hillery-Raton
7 Morval-Pino
8 Bundo-Gambler-Tolby
9 Burnac-Ponil
10 Etoe-Etown
11 Fuera-Dargol-Vamer
12 Ustolls-Rock Land
N
SCALE IN MILES
2 0 2 4 6 8 10
105°20'
105°10'
105°00'
104°50'
104°40'
104°30'
104°20'
104°10'
36°50'
36°40'
36°30'
36°20'
R15E
R16E
R17E
R18E
R19E
R20E
R21E
R22E
R23E
R24E
R25E
R26E
R27E
T32N
T31N
T30N
T29N
T28N
T27N
T26N
T25N
T24N
T23N
PHILMONT

Figure 1. General Soil Map of Colfax County, New Mexico

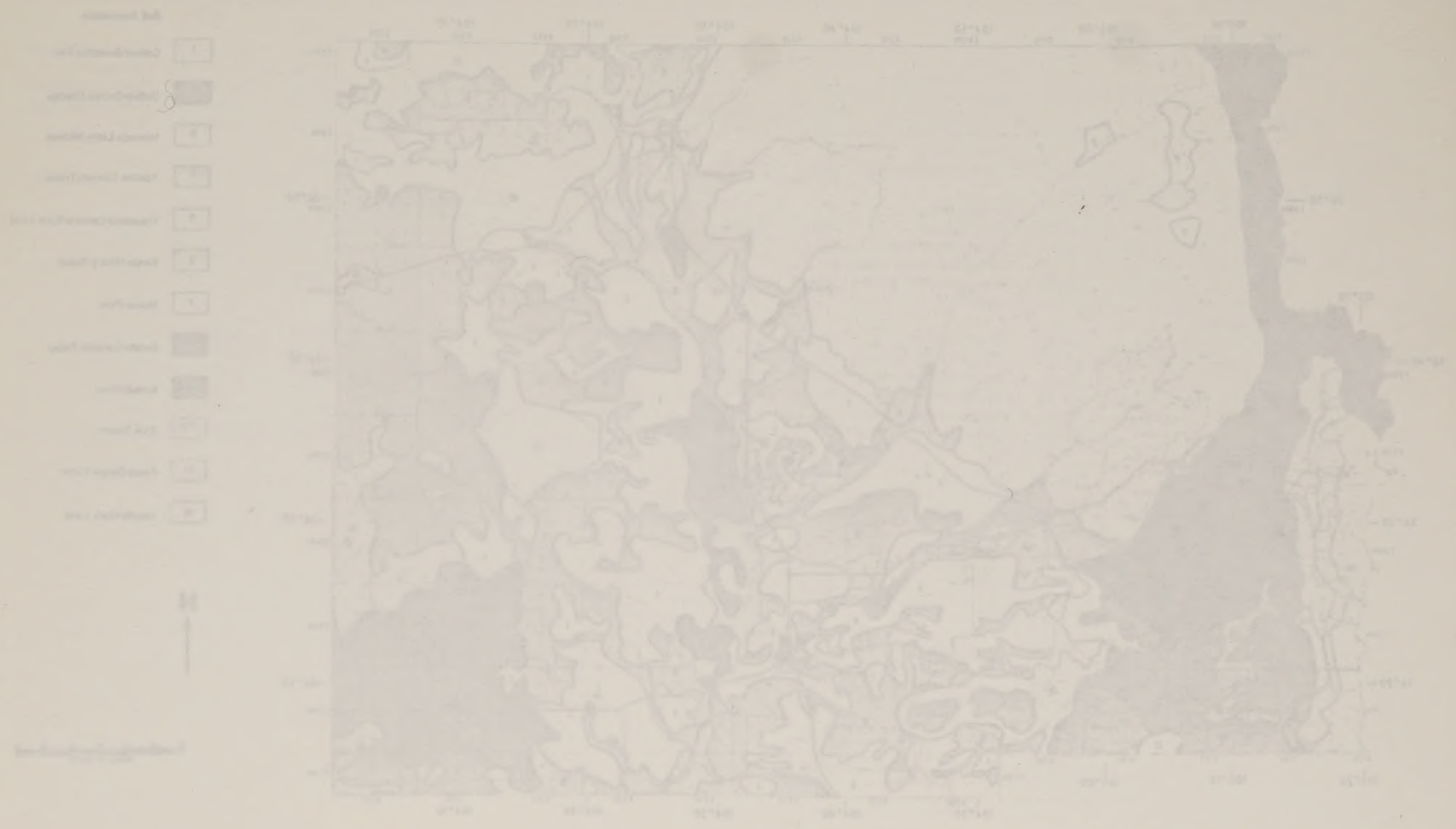
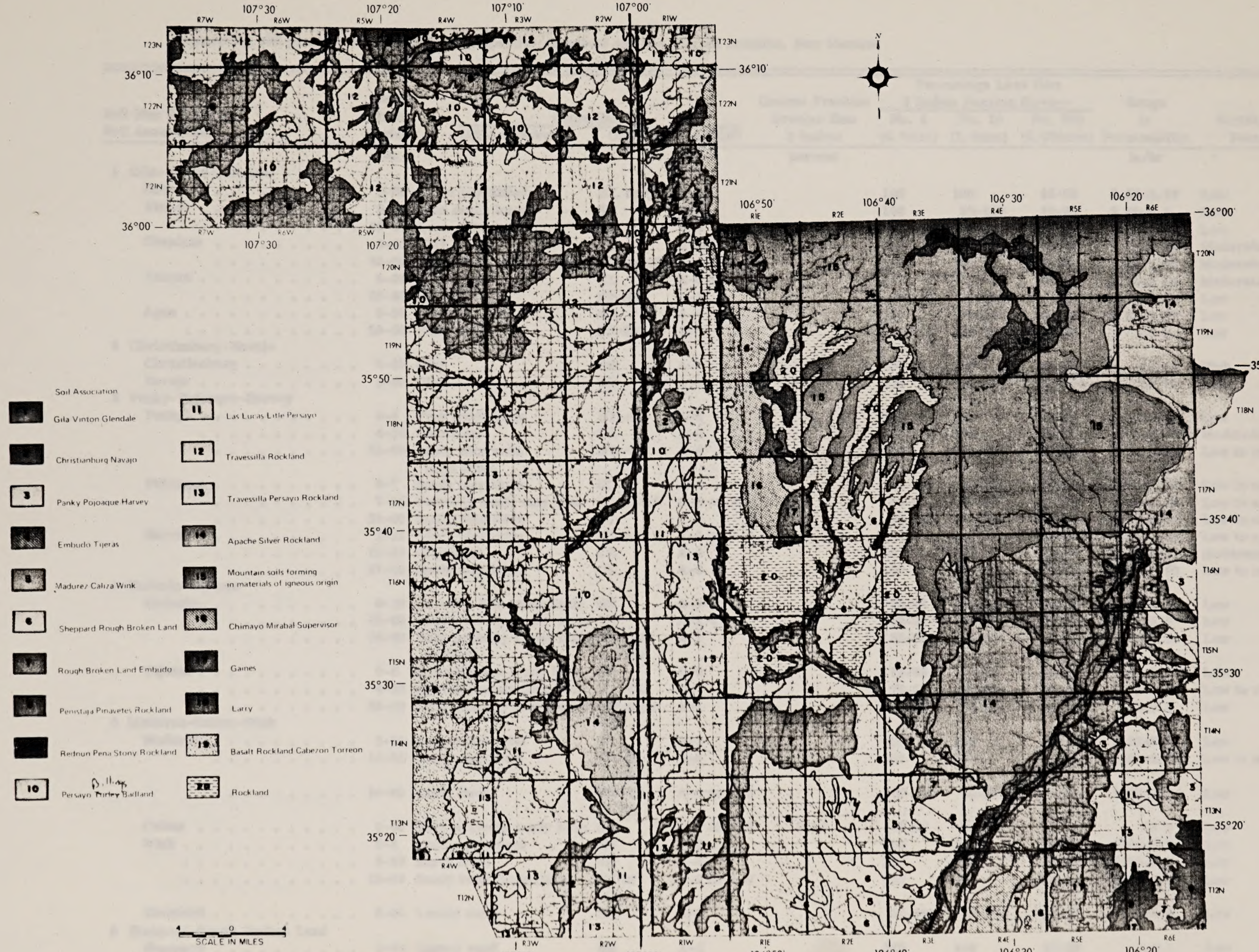


Figure 1. General Soil Map of Colfax County, New Mexico

Engineering soil groups and estimated soil properties, Colfax County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less than 3 inches			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	inches				percent				inches/hour	
1 Colmor-Swastika-Kim										
Colmor	0-10	Loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Low
	10-34	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate to high
	34-54	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
Swastika	0- 5	Silt loam	ML or CL	A-4		100	100	65-90	0.6-2.0	Low
	5-22	Clay	CH	A-7		100	100	85-95	< 0.2	High
	22-34	Silty clay loam	CL	A-6		100	100	85-95	0.2-0.6	Moderate
	34-60	Light clay loam	CL	A-4 or A-6		100	100	35-55	0.2-0.6	Moderate
Kim	0-12	Loam	ML	A-4		100	95-100	60-75	0.6-2.0	Low
	12-50	Light clay loam or loam	CL	A-6		100	95-100	60-75	0.6-2.0	Moderate
2 Dallam-Dumas-Dioxice										
Dallam	0- 6	Fine sandy loam	SM	A-4		100	100	35-50	2.0-6	Low
	6-50	Sandy clay loam	SC or CL	A-6		100	100	45-70	0.6-2.0	Low to moderate
Dumas	0- 7	Loam	ML or CL	A-4		100	100	50-75	0.6-2.0	Low
	7-48	Clay loam	CL	A-6		100	100	70-85	0.2-0.6	Moderate
	48+	Light lime layer								
Dioxice	0- 8	Fine sandy loam	ML	A-4		100	100	50-75	0.6-2.0	Low
	8-35	Clay loam	CL or SC	A-6		100	100	70-85	0.6-2.0	Moderate
	35+	High lime layer								
3 Vermejo-Litle-Midway										
Vermejo	0- 5	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate
	5-60	Silty clay	CH	A-7		100	100	90-95	< 0.2	High
Litle	0- 8	Silty clay loam	CL	A-6		100	100	85-95	0.2-0.6	Moderate
	8-24	Clay	CL	A-7		100	100	85-95	0.2-0.6	High
Midway	0-12	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate to high
	12+	Shale								
4 Apache-Torreon-Tricon										
Apache	0- 3	Stony loam	ML or CL	A-4	20-35	80-90	75-85	60-70	0.6-2.0	Low
	3-12	Stony clay loam	CL	A-6 or A-4	20-35	85-95	80-90	55-70	0.6-2.0	Low to moderate
	12+	Basalt								
Torreon	0-10	Silt loam	ML or CL	A-4		100	100	70-90	0.6-2.0	Low
	10-31	Clay	CH	A-7		100	100	75-95	< 0.2	High
	31-50	Silty clay loam	CL or CH	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate to high
	50-60	Loam	ML or CL	A-4		100	100	70-90		
Tricon	0- 7	Silt loam	ML	A-4		100	100	65-90	0.6-2.0	Low
	7-20	Clay	CH	A-7		100	100	75-95	< 0.2	High
	20-30	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
5 Travessilla-Carnero-Rock Land										
Travessilla	0-12	Stony loam	ML or SM	A-4	10-20	85-95	75-85	35-65	2.0-6	Low
	12+	Sandstone bedrock								
Carnero	0- 5	Loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Low
	5-30	Clay loam	CL	A-6		100	100	70-85	0.2-0.6	Moderate
	30+	Sandstone bedrock								
6 Barela-Hillery-Raton										
Barela	0- 4	Silt loam	ML	A-4		100	100	70-90	0.6-2.0	Low
	4- 9	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate
	9-30	Silty clay	CH	A-6 or A-7	20-25	95-100	90-95	80-90	< 0.2	High
	30-40	Stony silty clay	CH	A-6 or A-7	40-60	85-95	80-90	70-85	< 0.2	Moderate to high
	40+	Basalt bedrock								
Hillery	0-18	Stony loam	ML	A-4	5-10	90-100	90-100	60-75	0.6-2.0	Low to moderate
	18-60	Cobbly clay	CH	A-7	5-15	85-95	80-90	60-85	< 0.2	High
Raton	0- 7	Stony silt loam	ML or CL	A-4	30-45	90-100	85-95	60-85	0.6-2.0	Low
	7-16	Stony silt clay	CL	A-6 or A-7	40-50	90-100	85-95	60-75	0.2-0.6	Low to moderate
	16+	Bedrock								
7 Morval-Pino										
Morval	0-60	Clay loam	CL	A-6	0- 5	90-100	70-90	50-70	0.6-2.0	Moderate
Pino	0- 8	Loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Low
	8-14	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate to high

	14-37	Gravelly clay	CH or SC	A-7		55-65	50-60	40-60	< 0.2	High
	37-56	Gravelly clay	CH	A-7		25-85	70-90	50-75	< 0.2	High
Garrett (cold variant).	0- 8	Loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Low to moderate
	8-26	Sandy clay loam	SC	A-6		100	100	35-55	0.6-2.0	Moderate
	26-56	Sandy clay loam	SC	A-6		100	100	35-55	0.6-2.0	Moderate
	56-60	Sandy loam	SM	A-4		100	100	35-45	2.0-6.0	Low
8 Bundo-Gambler-Tolby										
Bundo	0-30	Gravelly sandy loam and gravelly loam	SM or GM	A-2	10-20	40-75	35-70	10-30	2.0-6.0	Low
	30-56	Gravelly loam	GM	A-2	5-15	35-50	30-45	30-35	2.0-6.0	Low
	56-94	Very gravelly sandy clay loam	GM or GC	A-2	5-15	30-50	25-45	10-25	2.0-6.0	Low
Gambler	0-12	Stony sandy loam	SM	A-2		90-100	85-95	25-35	2.0-6.0	Low
	12-17	Stony sandy clay loam	SC	A-2 or A-6	15-25	70-80	65-75	25-40	0.6-2.0	Low to moderate
	17-34	Stony sandy clay loam	SC	A-6	20-30	80-90	65-75	35-45	0.6-2.0	Low to moderate
	34-65	Stony sandy loam	SM	A-2	15-25	70-80	65-75	20-30	2.0-6.0	Low
Tolby	0-22	Very cobbly loam	GM	A-2 or A-4	20-60	40-70	35-65	25-50	2.0-6.0	Low
	22-44	Gravelly sandy loam	SM or GM	A-1 or A-2	25-40	55-70	50-65	10-20	> 6.0	Low
	44-57	Cobbly sandy loam	SM or GM	A-1 or A-2	25-55	55-75	50-70	15-30	>6.0	Low
	57-80	Cobbly loamy sand	SM or GM	A-1 or A-2	25-55	55-75	50-70	10-25	>6.0	Low
9 Burnac-Ponil										
Burnac	0-12	Stony loam	ML	A-4	25-45	90-100	85-95	50-70	0.6-2.0	Moderate
	12-31	Clay	CH	A-7		90-100	85-95	80-95	< 0.2	High
	31-53	Stony sandy clay	SC	A-6	20-40	75-90	70-85	35-50	< 0.2	High
	53+	Basalt								
Ponil	0- 4	Stony sandy clay loam	SC	A-6	5-10	95-100	95-100	35-55	0.6-2.0	Moderate
	4-35	Clay	CH	A-7	0-10	95-100	95-100	70-95	< 0.2	High
	35-60	Clay	CH	A-7		90-100	85-90	65-90	< 0.2	High
Fortwingate-like	0-10	Stony loam	ML or CL	A-4	45-55	85-95	80-90	50-70	0.6-2.0	Low to moderate
	10-26	Stony loam	ML or CL	A-4	20-30	95-100	90-100	55-75	0.6-2.0	Low to moderate
	26-67	Cobbly clay	CH	A-7	10-20	95-100	90-100	70-95	< 0.2	High
10 Etoe-Etown-Bundo										
Etoe	0-11	Cobbly loam	ML or CL	A-4	0-10	90-100	85-95	40-70	0.6-2.0	Low
	11-19	Cobbly loam	ML or CL	A-4	20-40	75-95	70-90	35-70	0.6-2.0	Low
	19-36	Cobbly fine sandy loam	SM or SC	A-4	20-40	75-95	70-90	30-70	2.0-6.0	Low
	36-73	Stony sandy clay loam	SC	A-2 or A-6	40-50	65-85	60-80	20-50	0.6-2.0	Low to moderate
Stown	0-26	Stony fine sandy loam	SM	A-4	35-45	90-100	85-95	35-50	2.0-6.0	Low
	26-39	Stony sandy clay loam	SC	A-6	45-55	95-100	90-100	30-55	0.6-2.0	Low to moderate
	39-50	Stony sandy clay	SC or CL	A-7	35-45	90-100	85-95	40-55	0.06-0.2	Moderate to high
	50-59	Stony sandy clay loam	SC	A-6	35-45	90-100	85-95	30-55	0.6-2.0	Low to moderate
	59-77	Stony loamy sand	SM	A-2	15-25	90-100	90-100	15-30	0.6-2.0	Low
Etown-like	0-13	Stony loam	ML or CL	A-4	15-20	95-100	90-100	55-75	0.6-2.0	Moderate
	13-32	Sandy loam	SM	A-2	0- 5	85-95	80-90	25-35	2.0-6.0	Low
	32-48	Gravelly sandy clay loam	SC	A-2	0-10	60-75	60-70	20-40	0.6-2.0	Low to moderate
	48-63	Clay	CH	A-7	0-10	95-100	95-100	70-95	< 0.2	High
11 Fuera-Dargol-Vamer										
Fuera	0-15	Cobbly loam	ML or CL	A-4	30-40	95-100	90-100	55-75	0.6-2.0	Low to moderate
	15-31	Cobbly clay	CH	A-7	20-30	95-100	90-100	70-95	< 0.2	High
	31-64	Cobbly clay	CH	A-7	55-65	85-100	80-95	60-90	< 0.2	High
Dargol	0- 6	Stony loam	ML	A-4	10-15	100	100	60-75	0.6-2.0	Low
	6-35	Clay	CH	A-7	5-15	100	100	75-95	< 0.2	High
	35+	Sandstone bedrock							< 0.2	High
Vamer	0- 3	Stony loam	ML	A-4	10-20	100	80-90	50-60	0.6-2.0	Low
	3-13	Clay	CH	A-7		100	100	75-95	< 0.2	High
	13+	Sandstone								
12 Ustolls-Rock Land										
Ustolls	0- 6	Clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate to high
	6-26	Clay	CH	A-7		100	100	75-95	< 0.2	High
	26-60	Silty clay	CH	A-7		100	100	90-95	< 0.2	High
Rock Land and Stony Land		(no extimates made)								
Remunda-like	0- 4	Stony silty clay loam	CL	A-6 or A-7	15-30	95-100	90-100	75-95	0.2-0.6	Moderate to high
	4-10	Silty clay	CH	A-7		100	100	90-95	< 0.2	High
	10-15	Gravelly silty clay	CH	A-7	5-10	80-90	75-85	70-80	< 0.2	High
	15-60	Clay	CH	A-7		100	100	75-95	< 0.2	High



Soil Association
1 Gila Vinton Glendale
2 Christianburg Navajo
3 Panky Pojoaque Harvey
4 Embudo Tijeras
5 Madurez Caliza Wink
6 Sheppard Rough Broken Land
7 Rough Broken Land Embudo
8 Penistaja Pinavetes Rockland
9 Rednun Pena Stony Rockland
10 Persayo ~~Turley~~ Badland
Billings
11 Las Lucas Litle Persayo
12 Travessilla Rockland
13 Travessilla Persayo Rockland
14 Apache Silver Rockland
15 Mountain soils forming in materials of igneous origin
16 Chimayo Mirabal Supervisor
17 Gaines
18 Larry
19 Basalt Rockland Cabezon Torreon
20 Rockland
0
SCALE IN MILES
N
107°30'
107°20'
107°10'
107°00'
106°50'
106°40'
106°30'
106°20'
36°10'
36°00'
35°50'
35°40'
35°30'
35°20'
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
R3E
R4E
R5E
R6E
T23N
T22N
T21N
T20N
T19N
T18N
T17N
T16N
T15N
T14N
T13N
T12N

Fig. 1. General soil map of Sandoval and Los Alamos counties, New Mexico

Engineering soil groups and estimated soil properties, Sandoval and Los Alamos counties, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less than 3 Inches Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.				percent				in/hr	
1 Gila-Vinton-Glendale										
Gila	0-60	Loam (stratified)	ML or CL	A-4		100	100	45-85	0.63-2.00	Low
Vinton	0-10	Fine sandy loam	SM	A-2		100	95-100	10-35	2.00-6.3	Low
	10-60	Loamy fine sand	SM	A-2		100	95-100	10-30	2.00-6.3	Low
Glendale	0-40	Clay loam	CL	A-6		100	100	75-95	0.05-0.63	Moderate to high
	40-60	Sandy loam to clay loam	ML or CL	A-4 or A-6		100	100	75-95	0.20-2.00	Moderate
Anapra	0-26	Clay loam	CL	A-6 or A-7		100	100	65-85	0.20-0.63	Moderate
	26-60	Fine sand	SP-SM	A-3		95-100	95-100	5-15	>6.3	Low
Agua	0-26	Loam	ML	A-4		100	95-100	45-60	0.63-2.00	Low
	26-50	Fine sand	SP-SM	A-3		95-100	90-100	5-15	>6.3	Low
2 Christianburg-Navajo										
Christianburg	0-60	Clay	CH	A-7		100	100	75-95	<0.20	High
Navajo	0-60	Clay	CH	A-7		100	100	90-100	<0.20	High
3 Panky-Pojoaque-Harvey										
Panky	0-4	Fine sandy loam	ML-CL	A-4		100	100	70-85	2.00-6.3	Low
	4-24	Clay loam	CL	A-6		100	100	75-90	0.20-0.63	Moderate to high
	24-60	Sandy clay loam (high lime)	ML-CL	A-4		100	100	50-60	0.63-2.00	Low to moderate
Pojoaque	0-7	Sandy clay loam	SC	A-6		95-100	90-100	35-50	0.63-2.00	Low to moderate
	7-25	Gravelly sandy clay loam	SC or SM	A-6 or A-4		80-90	70-80	25-40	0.63-2.00	Low to moderate
	25-60	Sandy clay loam	SC	A-6		90-100	89-90	35-45	0.63-2.00	Low to moderate
Harvey	3-12	Sandy clay loam	ML or CL	A-4 or A-6		100	100	50-60	0.63-2.00	Low to moderate
	12-27	Clay loam	CL	A-6		100	100	70-80	0.63-2.00	Moderate
	27-60	Sandy clay loam	CL	A-6		100	100	50-60	0.63-2.00	Low to moderate
4 Embudo-Tijeras										
Embudo	0-18	Gravelly fine sandy loam	SM	A-2-4		75-85	70-85	20-30	2.00-6.3	Low
	18-24	Very gravelly sandy loam	SM	A-2-4		40-55	35-50	15-25	2.00-6.3	Low
	24-60	Very gravelly loamy sand or sand	GW-GM or GM	A-1		35-50	30-50	0-15	>6.3	Low
Tijeras	0-4	Gravelly fine sandy loam	SM	A-2		75-85	70-85	20-30	2.00-6.3	Low
	4-25	Gravelly sandy clay loam	ML-CL	A-6		75-85	70-85	35-45	0.63-2.00	Low to moderate
	25-60	Very gravelly loamy sand	GW-G or GM	A-1		35-50	35-50	5-15	>6.3	Low
5 Madurez-Caliza-Wink										
Madurez	0-10	Loamy fine sand	SM	A-2		100	100	20-35	2.00-6.3	Low
	10-16	Sandy clay loam	SM-SC or SC	A-6		100	100	40-60	0.63-2.00	Low to moderate
	16-60	Sandy loam	ML-CL or SM	A-4 or A-2		95-100	95-100	20-35	2.00-6.3	Low
Caliza	0-50	Very gravelly sandy loam	GM	A-1 or A-2	0-10	35-50	25-40	10-25	<6.3	Low
Wink	0-9	Loamy fine sand	SM	A-2		100	100	20-35	2.00-6.3	Low
	9-32	Sandy loam	SM	A-2		100	100	25-40	2.00-6.3	Low
	32-60	Sandy loam (high lime)	SM or CL	A-2 or A-4		100	100	30-55	0.63-2.00	Low
Bluepoint	0-60	Loamy sand	SM	A-2		95-100	95-100	10-25	>6.3	Low
6 Sheppard-Rough Broken Land										
Sheppard	0-60	Loamy sand	SM	A-2		100	100	10-25	>6.3	Low
Rough broken land	(Estimates not made)									

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less than 3 Inches Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.				percent				in/hr	
7 Rough Broken Land-Embudo										
Rough broken land		(Estimates not made)								
Embudo.		(See association 4)								
Casajo	0-12	Gravelly sandy loam	SM	A-2		65-80	60-75	15-30	2.00-6.3	Low
. . . .	12-24	Gravelly loamy sand	SM	A-2		65-80	60-75	20-35	2.00-6.3	Low
. . . .	24-60	Very gravelly loamy sand	GM	A-1 or A-2	0-5	35-50	25-40	10-20	>6.3	Low
8 Penistaja-Pinavetes-Rockland										
Penistaja	0-3	Fine sandy loam	ML	A-4		100	100	45-60	2.00.6.3	Low
. . . .	3-30	Sandy clay loam	CL	A-6		100	100	50-75	0.63-2.00	Low to moderate
. . . .	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.63-2.00	Low
Pinavetes	0-60	Loamy fine sand	SM	A-2		100	100	20-35	2.00-6.30	Low
Rockland		(Estimates not made)								
9 Redmun-Pena-Stony Rockland										
Redmun	0-7	Loam	ML	A-4		100	100	65-80	0.63-2.00	Low
. . . .	7-35	Clay loam	CL	A-6 or A-7		100	100	75-90	0.20-0.63	Moderate
. . . .	35-50	Sandy clay loam	CL	A-6		100	100	55-75	0.63-2.00	Low to moderate
Pena	0-13	Stony clay loam	CL or ML	A-6 or A-4	30-40	95-100	85-100	60-75	0.63-2.00	Low to moderate
. . . .	13-24	Very gravelly clay loam	SM	A-1-b	0-10	65-75	55-65	40-50	0.63-2.00	Low
. . . .	24-60	Very gravelly loam	SM	A-1-b	20-40	60-75	50-60	35-45	2.00-6.30	Low
Stony rockland.		(Estimates not made)								
10 Persayo-Turley-Badland										
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.20-0.63	Moderate
. . . .	12+	Shale								
Turley	0-60	Silty clay loam	CL	A-6 or A-7		100	100	75-90	0.20-0.63	Moderate
Badland.		(Estimates not made)								
11 Las Lucas-Litle-Persayo										
Las Lucas	0-5	Loam	ML	A-6 or A-4		100	100	60-80	0.63-2.00	Moderate
. . . .	5-26	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	High
. . . .	26-50	Light silty clay loam	CL	A-6		100	100	80-95	0.20-0.63	Moderate to high
Litle	0-6	Silty clay loam	CL	A-6		100	100	85-100	0.20-0.63	Moderate to high
. . . .	6-28	Clay	CL	A-7		100	100	90-100	<0.20	High
. . . .	28+	Shale								
Persayo		(See association 10)								
12 Travessilla-Rockland										
Travessilla	0-14	Sandy loam	SM	A-4 or A-2-4		90-95	80-90	25-50	2.00-6.3	Low
. . . .	14+	Sandstone								
Rockland		(Estimates not made)								
13 Travessilla-Persayo-Rockland										
Travessilla	0-14	Sandy loam	SM	A-4 or A-2-4		90-95	80-90	25-50	2.00-6.3	Low
. . . .	14+	Sandstone								
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.20-0.63	Moderate
. . . .	12+	Shale								
14 Apache-Silver-Rockland										
Apache	0-9	Stony fine sandy loam	SM	A-4	25-35	95-100	95-100	40-50	2.00-6.30	Low
. . . .	9-16	Stony loam	CL	A-6	10-20	95-100	90-100	50-60	0.63-2.00	Low to moderate
. . . .	16+	Basalt								

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less than 3 Inches Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.				percent				in/hr	
Silver	0-3	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low to moderate
	3-14	Clay	CL	A-6 or A-7		100	100	85-95	<0.20	High
	14-45	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
	45-60	Loam	ML	A-6		100	100	80-90	0.63-2.00	Low to moderate
Rockland	(Estimates not made)									
15 Mountain Soils Forming in Materials of Igneous Origin										
Unnamed soil (A)	0-7	Sandy loam	SM	A-2		95-100	95-100	35-45	2.00-6.3	Low
	7-18	Sandy clay loam	SC	A-6		95-100	95-100	35-45	0.63-2.00	Low to moderate
	18-30	Sandy loam	SM	A-2		95-100	95-100	35-45	2.00-6.3	Low
	30+	Tuff								
Unnamed soil (B)	0-13	Sandy loam	SM	A-2		95-100	95-100	35-45	2.00-6.3	Low
16 Chimayo-Mirabal-Supervisor										
Chimayo	0-6	Stony loam	ML	A-4	15-25	90-100	75-85	35-45	0.63-2.00	Low
	6-18	Cobbly loam	ML	A-4	25-35	85-95	60-85	30-45	2.00-6.30	Low
Mirabal	0-18	Very stony	SM	A-1-b	40-70	70-95	65-90	20-35	2.00-6.30	Low
Supervisor	0-10	Gravelly sandy loam	SM	A-1-b	5-15	90-100	75-85	25-35	2.00-6.30	Low
	10-23	Very gravelly loamy sand	SM	A-1-b	5-15	80-90	55-65	10-20	2.00-6.30	Low
17 Gaines										
Gaines	0-4	Loam	ML-CL	A-4		100	95-100	50-60	0.63-2.00	Low to moderate
	4-36	Clay	CH	A-7		100	100	80-95	<0.20	High
	36+	Limestone bedrock								
Unnamed soil (C)	0-12	Sandy loam	SM	A-2		95-100	95-100	35-45	2.00-6.3	Low
	12-22	Sandy clay loam	SC	A-6		95-100	95-100	30-40	0.63-2.00	Low to moderate
	22+	Sandstone bedrock								
Unnamed soil (D)	0-3	Clay loam	CL	A-6		100	100	55-65	0.20-0.63	Moderate
	3-32	Clay	CH	A-7		100	100	80-95	<0.20	High
18 Larry										
Unnamed soil (E)	0-26	Silt loam	ML or ML-CL	A-4		100	95-100	50-60	0.20-0.63	Low to moderate
	26+	Gravelly sand and pumice								
Larry	0-20	Silt loam	ML or ML-CL	A-4		100	95-100	50-60	0.20-0.63	Low
	20-50	Clay	CH	A-7		100	100	75-100	<0.20	High
Unnamed soil (F)	0-28	Silt loam	ML or ML-CL	A-4		100	95-100	50-60	0.20-0.63	Low to moderate
	28-45	Gravelly loam	ML	A-4		75-85	70-85	30-40	2.00-6.3	Low
	45+	Pumice and gravel								
19 Basalt Rockland-Cabezon-Torreon										
Basalt rockland	(Estimates not made)									
Cabezon	0-3	Stony loam	GM	A-4		45-55	40-50	20-40	0.63-2.00	Low
	3-12	Clay	CH	A-7		100	100	80-90	<0.20	High
	12+	Basalt bedrock								
Torreon	0-9	Loam	CL	A-6		100	100	65-75	0.63-2.00	Moderate
	9-30	Clay	CH	A-7		100	100	80-90	0.20	High
	30-60	Clay loam	CL	A-6		100	100	65-80	0.63-2.00	Moderate
20 Rockland	(Estimates not made)									

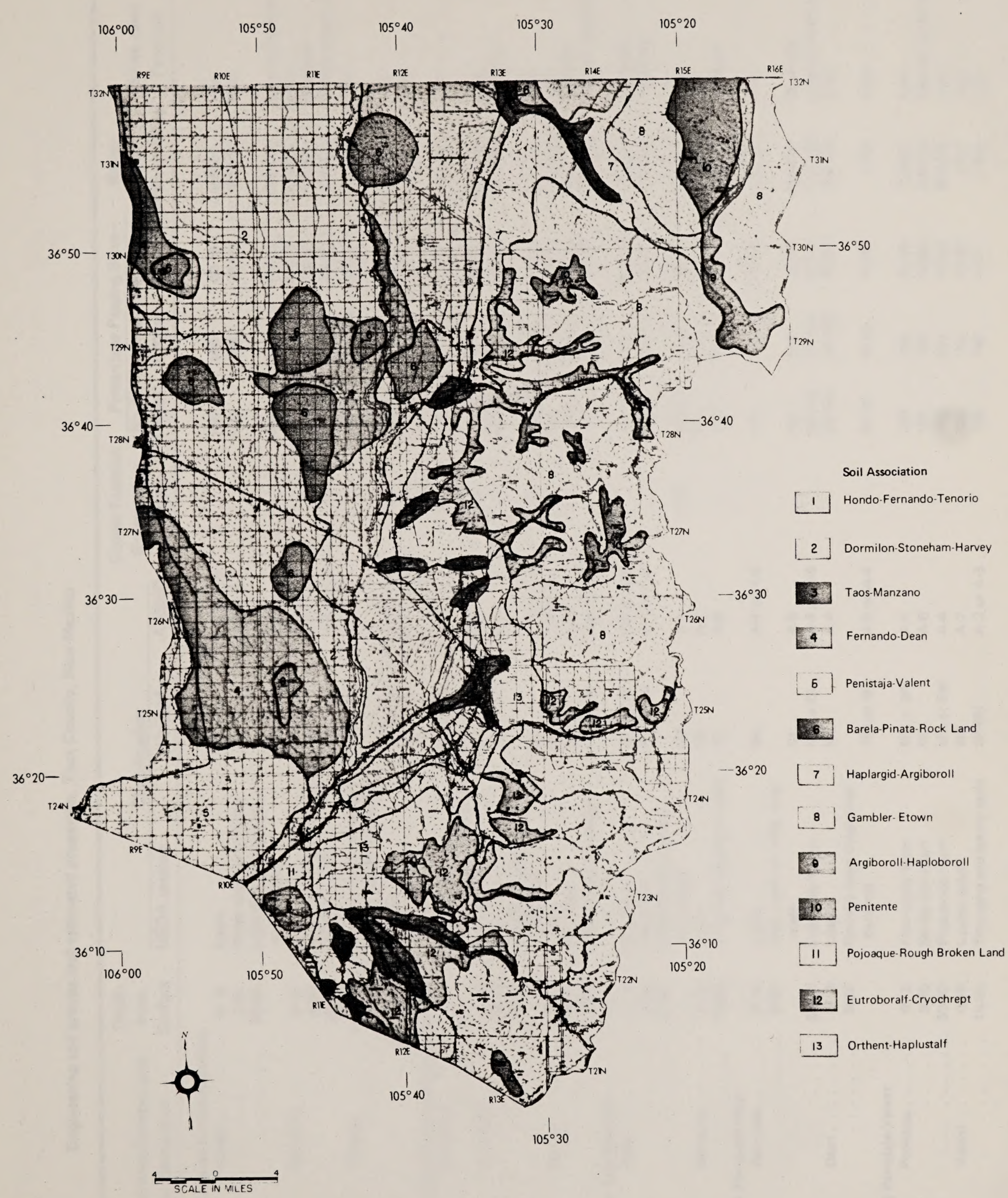

106°00
105°50
105°40
105°30
105°20
R9E
R10E
R11E
R12E
R13E
R14E
R15E
R16E
T32N
T31N
T30N
T29N
T28N
T27N
T26N
T25N
T24N
T23N
T22N
T21N
36°50
36°40
36°30
36°20
36°10
N
4
0
4
SCALE IN MILES
Soil Association
1 Hondo-Fernando-Tenorio
2 Dormilon-Stoneham-Harvey
3 Taos-Manzano
4 Fernando-Dean
5 Penistaja-Valent
6 Barela-Pinata-Rock Land
7 Haplargid-Argiboroll
8 Gambler-Etown
9 Argiboroll-Haploboroll
10 Penitente
11 Pojoaque-Rough Broken Land
12 Eutroboralf-Cryochrept
13 Orthent-Haplustalf

Figure 1. General Soil Map of Taos County, New Mexico

Engineering soil groups and estimated properties, Taos County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve— No.4 (4.7mm)	No. 10 (2.00mm)	No. 200 (0.074mm)	Range in Permeability	Shrink-swell Potential
1 Hondo-Fernando-Tenorio										
Hondo	0- 5	Loam	ML	A-4 or A-6		100	100	60-75	0.6-2.0	Low
. . . .	5-20	Heavy clay loam or clay	CL	A-6 or A-7		100	100	75-90	0.2-0.6	High
. . . .	20-60	Light clay or sandy clay loam (limy)	ML	A-4		100	100	50-65	0.2-2.0	Low to moderate
Fernando.	0- 6	Loam	ML	A-4 or A-6		100	100	55-75	0.6-2.0	Low
. . . . . .	6-29	Clay loam or silty clay loam	CL	A-6		100	100	70-85	0.2-0.6	Moderate
	29-60	Light clay loam	ML or CL	A-4 or A-6		90-100	85-100	60-75	0.2-2.0	Low to moderate
Tenorio	0- 4	Loam or heavy sandy loam	SM or ML	A-4		95-100	95-100	40-65	0.6-2.0	Low
. . . . . .	4-24	Gravelly sandy clay loam and gsl	GP or GC	A-1 or A-2		25-45	20-35	5-25	2.0-6.0	Low
. . . .	24-60	Sand and gravel	GP	A-1	0-10	20-45	15-35	0-5	> 6.0	Low
2 Dormilon-Stoneham-Harvey										
Dormilon	0-15	Stony loam	GM or ML	A-4	15-20	70-90	75-85	45-65	0.6-2.0	Low
. . . . .	15+	Basalt bedrock and stones								
Stoneham	0- 5	Cobbly loam	ML	A-4	10-25	75-85	70-80	50-60	0.6-2.0	Low
. . . . .	5-18	Clay loam	CL	A-6	0- 5	85-95	80-90	60-75	0.6-2.0	Moderate
. . . . .	18-60	Cobbly or gravelly loam (high lime)	ML	A-4 or A-6	10-15	75-90	70-85	50-65	0.6-2.0	Low
Harvey	3-12	Loam	ML or CL	A-4 or A-6		100	100	50-60	0.6-2.0	Low
. . . .	12-27	Clay loam	CL	A-6		100	100	70-80	0.6-2.0	Moderate
. . . .	27-60	Sandy clay loam (limy)	ML or CL	A-4 or A-6		100	100	50-60	0.6-2.0	Low to moderate
3 Taos-Manzano										
Taos	0- 9	Clay loam	ML or CL	A-4 or A-6		100	100	60-95	0.6-2.0	Moderate
. . . .	9-20	Clay loam	ML or CL	A-4 or A-6		100	100	60-95	0.2-0.6	Moderate
. . . .	20-60	Stratified sand, gravel, and cobble	GP	A-1	0-10	20-50	15-35	0-5	> 6.0	Low
Manzano	0-10	Loam	ML	A-4		100	100	60-80	0.6-2.0	Low
. . . . . .	10-50	Clay loam and heavy loam	CL	A-6		100	100	60-85	0.2-0.6	Moderate
4 Fernando-Dean										
Fernando	0- 6	Loam	ML	A-4 or A-6		100	100	55-75	0.6-2.0	Low
. . . . .	6-30	Clay loam or silty clay loam	CL	A-6		100	100	70-85	0.2-0.6	Moderate
. . . . .	30-60	Light clay loam	ML or CL	A-4 or A-6		90-100	85-100	60-75	0.2-2.0	Low to moderate
Dean	0- 9	Loam	ML	A-4		95-100	95-100	60-75	0.6-2.0	Low
. . . .	9-36	Gravelly loam (high lime content)	GM or ML	A-2 or A-4		50-70	45-65	30-50	< 0.2	Low
5 Penistaja-Valent										
Penistaja	0- 5	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
. . . . . .	5-30	Sandy clay loam	CL	A-6		100	100	50-65	0.6-2.0	Low to moderate
. . . . . .	30-60	Fine sandy loam	ML or SM	A-4		100	100	45-65	0.6-2.0	Low
Valent	0-10	Loamy sand	SM	A-2		100	100	15-30	>6.0	Low
. . . .	10-60	Fine sand and loamy sand	SP-SM	A-2 or A-3		100	100	5-30	>6.0	Low

6 Barela-Pinata-Rock Land										
Barela	0- 8	Cobbly loam	ML or CL	A-4 or A-6	0-10	95-100	90-100	60-85	0.2-0.6	Low
	8-30	Cobbly clay or clay	CH or CL	A-7	0-25	95-100	90-100	70-95	<0.2	High
	30-45	Cobbly or very cobbly clay loam	CH or CL	A-7 or A-6	20-50	85-95	75-85	55-80	< 0.2	Moderate to high
	45+	Basalt								
Pinata	0-14	Cobbly or stony loam	ML or CL	A-4 or A-6	35-70	80-95	75-95	50-75	0.6-2.0	Low
	14-36	Stony clay and very cobbly clay	CH or CL	A-7	20-50	85-95	75-85	55-80	0.2-0.6	Moderate
	36-60	Very cobbly and very stony clay	CH or CL	A-7 or A-6	30-80	80-95	70-85	50-75	0.2-0.6	Moderate
Rock Land		(Engineering estimates not made)								
7 Haplargid-Argiboroll										
Borollic Haplargids.	0- 6	Gravelly loam or gravelly clay loam	ML or GM	A-4 or A-6	0-15	65-85	60-75	35-55	0.6-2.0	Low to moderate
	6-30	Very gravelly clay loam	CL or GC	A-6 or A-4	5-20	55-80	50-70	25-55	0.2-2.0	Moderate
	30-50	Very gravelly or very cobbly clay loam	CL or GC	A-6 or A-4	15-50	50-75	45-70	25-50	0.2-2.0	Low to moderate
	50+	Fractured bedrock								
Aridic Argiboroll. .	0-10	Gravelly loam or gravelly clay loam	GM or GC	A-4 or A-2	0- 5	50-65	45-60	30-50	0.6-2.0	Low to moderate
	10-45	Very gravelly clay loam	GC	A-6 or A-2	0-15	50-75	45-65	25-50	0.2-2.0	Moderate
	45-55	Gravelly and cobbly sandy clay loam	GM	A-4 or A-2	10-35	50-75	45-70	25-50	0.2-2.0	Low
	55+	Fractured bedrock								
		(Engineering estimates not made)								
8 Gambler-Etown										
Gambler	0-15	Cobbly sandy loam	SM	A-2	15-25	70-85	60-75	25-35	2.0-6.0	Low
	15-40	Cobbly or stony sandy clay loam	SC	A-6	20-30	80-90	60-75	35-45	0.6-2.0	Low to moderate
	40-60+	Cobbly sandy loam	SM	A-2	15-25	70-80	60-75	20-30	2.0-6.0	Low
Etown	0-20	Cobbly fine sandy loam	SM	A-4	35-45	90-100	85-95	35-50	2.0-6.0	Low
	20-40	Cobbly sandy clay loam	SC	A-6	45-55	95-100	90-100	35-55	0.6-2.0	Low to moderate
	40-50	Cobbly sandy clay	SC or CL	A-7	35-45	90-100	85-95	40-55	0.6-2.0	Moderate to high
	50-60	Cobbly sandy clay loam	SC	A-6	35-45	90-100	85-95	35-55	0.6-2.0	Low to moderate
Angostura	0-10	Cobbly very fine sandy loam	GM or ML	A-4	15-35	65-85	65-80	35-65	0.6-2.0	Low
	10-55	Very cobbly sandy clay loam	SC	A-4	35-50	70-90	65-85	35-50	0.6-2.0	Low to moderate
	55-70	Very cobbly sandy loam	GM or SM	A-2 or A-1	50-75	40-55	35-50	20-35	> 6.0	Low
Flechado	0-10	Cobbly loam	ML or CL	A-4	10-25	85-100	80-95	50-65	0.6-2.0	Low
	10-24	Cobbly clay loam	CL	A-6	25-50	90-100	85-95	60-75	0.6-2.0	Low to moderate
	24-60	Very cobbly clay loam	CL	A-6	35-70	90-100	85-95	60-75	0.2-2.0	Low
9 Argiboroll-Haploboroll										
Aridic Argiborolls fine	0-10	Loam or cobbly loam	ML or CL	A-4	0-25	95-100	90-100	60-75	0.6-2.0	Low
	10-35	Gravelly clay or clay	CH	A-7	0- 5	70-95	70-90	55-85	< 0.2	High
	35-60	Loams; clay loams; often cobbly	CL	A-6	5-40	60-95	60-90	50-85	0.2-2.0	Low to moderate
Aridic Argiborolls, fine loamy	0-12	Loam	ML	A-4	0- 5	90-100	85-		0.6-2.0	Low
	12-60	Clay loam	CL	A-6	0- 5	90-100	70-90	50-85	0.2-2.0	Moderate
Cumulic Haploborolls	0-15	Loam	ML or CL	A-4		95-100	95-100	60-75	0.6-2.0	Low
	15-40	Clay loam	CL	A-6		95-100	95-100	70-80	0.2-0.6	Moderate
	40-60	Stratified loams, clay loams and scl	CL or ML	A-6		95-100	95-100	35-80	0.6-2.0	Low

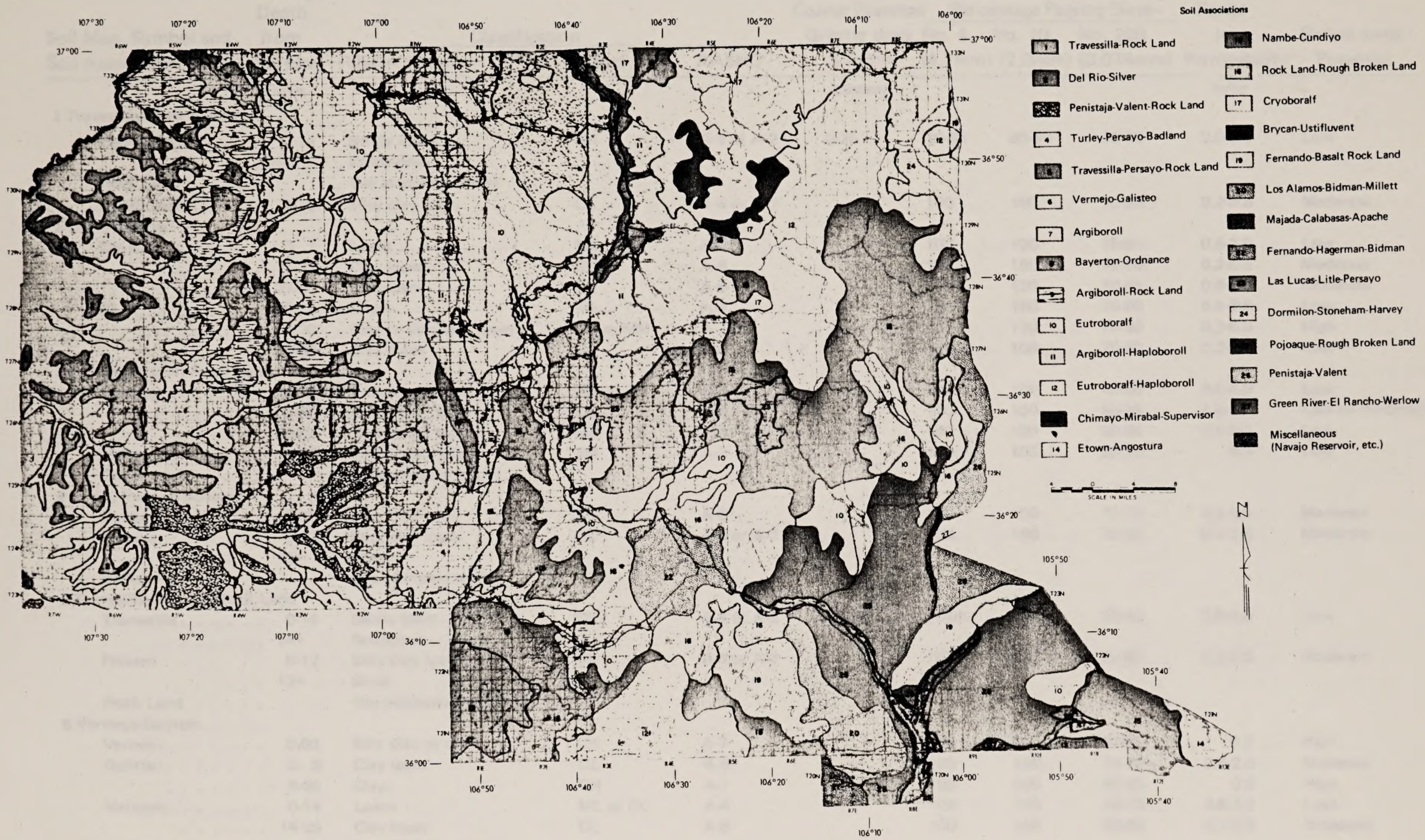

Soil Associations
Travessilla-Rock Land
Del Rio-Silver
Penistaja-Valent-Rock Land
Turley-Persayo-Badland
Travessilla-Persayo-Rock Land
Vermejo-Galisteo
Argiboroll
Bayerton-Ordnance
Argiboroll-Rock Land
Eutroboralf
Argiboroll-Haploboroll
Eutroboralf-Haploboroll
Chimayo-Mirabal-Supervisor
Etown-Angostura
Nambe-Cundiyo
Rock Land-Rough Broken Land
Cryoboralf
Brycan-Ustifluvent
Fernando-Basalt Rock Land
Los Alamos-Bidman-Millett
Majada-Calabasas-Apache
Fernando-Hagerman-Bidman
Las Lucas-Litle-Persayo
Dormilon-Stoneham-Harvey
Pojoaque-Rough Broken Land
Penistaja-Valent
Green River-El Rancho-Werlow
Miscellaneous
(Navajo Reservoir, etc.)
SCALE IN MILES
107°30'
107°20'
107°10'
107°00'
106°50'
106°40'
106°30'
106°20'
106°10'
106°00'
105°50'
105°40'
37°00'
36°50'
36°40'
36°30'
36°20'
36°10'
36°00'

Fig. 1. General Soil Map of Rio Arriba County, New Mexico

Engineering soil groups and estimated properties, Rio Arriba County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--: No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)	Range in Permeability	Shrink-swell Potential
	inches				percent				in/hr	
1 Travessilla-Rock Land										
Travessilla	0-14	Sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone								
Rock Land		(No estimates made)								
Persayo-like	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
2 Del Rio-Silver										
Del Rio	0- 7	Loam	ML	A-4		100	100	75-90	0.6-2.0	Low
	7-37	Clay loam	CL	A-6		100	100	75-90	0.2-0.6	Moderate
	37-60	Clay loam	CL	A-6		100	100	70-85	0.6-2.0	Moderate
Silver	0- 8	Loam	ML	A-4		100	100	70-90	0.6-2.0	Low
	8-30	Clay or silty clay loam	CH or MH	A-7		100	100	75-90	0.2-0.6	High
	30-60	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Low
3 Penistaja-Valent-Rock Land										
Penistaja	0- 3	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
	3-30	Sandy clay loam	CL	A-6		100	100	50-65	0.6-2.0	Low to moderate
	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.6-2.0	Low
Valent	0-60	Loamy fine sand	SM	A-2		100	100	20-35	6.0	Low
Rock Land		(No estimates made)								
4 Turley-Persayo-Badland										
Turley	0-60	Silty clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	12+	Shale								
Badland		(No estimates made)								
5 Travessilla-Persayo-Rock Land										
Travessilla	0-14	Sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone								
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	12+	Shale								
Rock Land		(No estimates made)								
6 Vermejo-Galisteo										
Vermejo	0-60	Silty clay or clay	CH	A-7		100	100	85-95	0.2	High
Galisteo	0- 6	Clay loam	CL	A-6		100	100	70-80	0.6-2.0	Moderate
	6-60	Clay	CH	A-7		100	100	90-95	0.2	High
Manzano	0-14	Loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Low
	14-55	Clay loam	CL	A-6		100	100	60-80	0.2-0.6	Moderate
Gullied Land		(No estimates made)								
7 Argiboroll										
Aridic Argiborolls (fine family)	0- 4	Cobbly clay loam	CL	A-6	15-50	95-100	90-100	70-80	0.2-2.0	Moderate
	4-20	Clay	CH	A-7	0- 5	95-100	90-100	75-95	0.2	High
	20-36	Silty clay loam	CL or CH	A-6 or A-7	0-10	95-100	90-100	85-95	0.2-0.6	Moderate to high
	36+	Weathered shale								

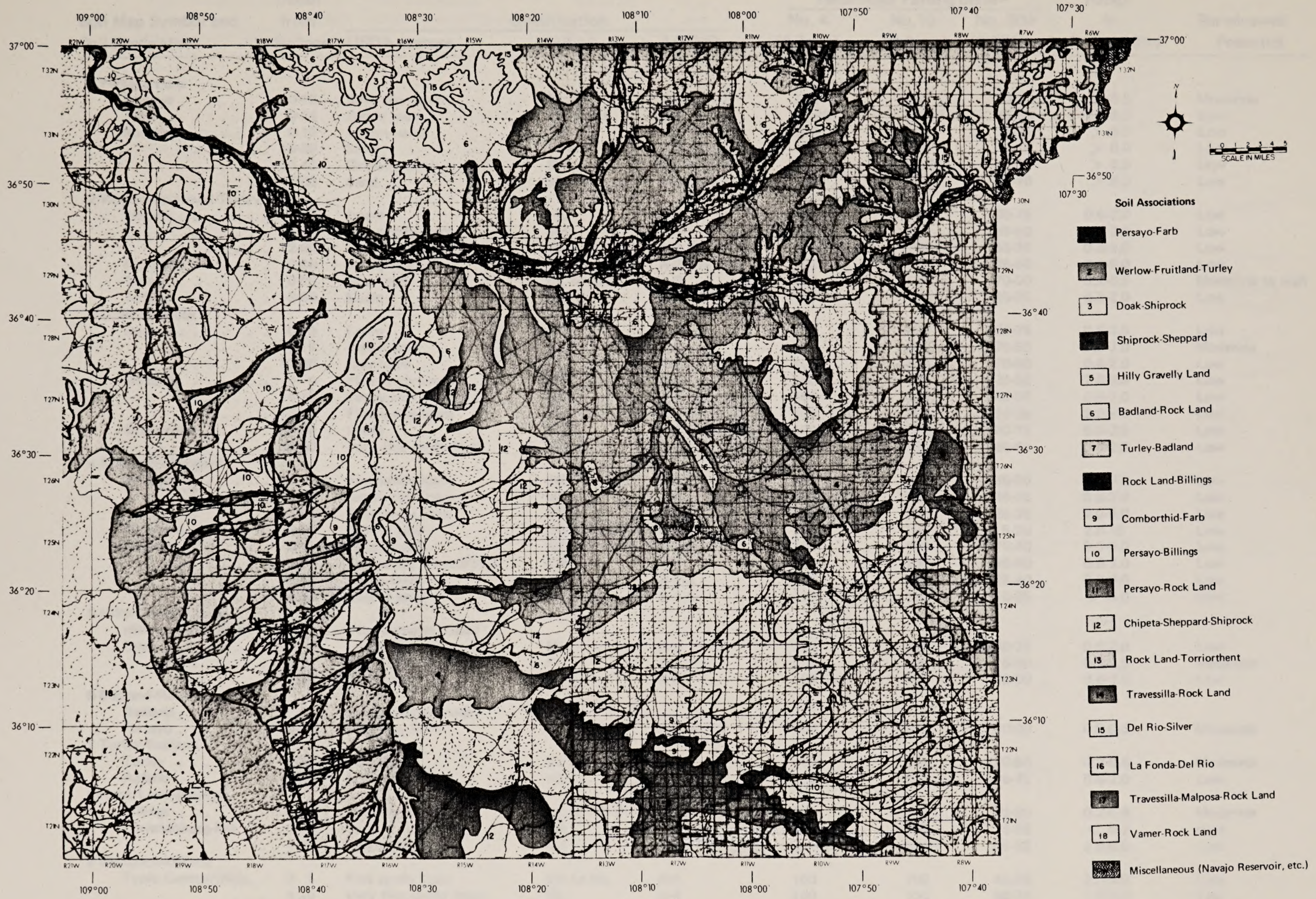
Aridic Argiborolls										
(fine-loamy family) .	0- 3	Cobbly sandy loam	SM	A-2 or A-4	15-45	85-100	85-100	30-40	2.0-6.0	Low
. . . .	3-34	Sandy clay loam	SC or CL	A-6	0-10	95-100	95-100	35-60	0.2-2.0	Moderate
. . . .	34-40	Sandy loam	SM	A-2 or A-4	0-10	85-100	85-100	30-40	2.0-6.0	Low
. . . .	40+	Weathered sandstone								
8 Bayerton-Ordnance										
Bayerton	0- 3	Fine sandy loam	SM or ML	A-2 or A-4	0- 5	100	100	45-55	2.0-6.0	Low
. . . . . .	3-29	Sandy clay loam and sandy loam	SC or CL	A-6		100	100	35-60	0.2-0.6	Moderate
. . . . . .	29-35	Sandy loam	SM	A-2 or A-4	0- 5	100	100	30-40	2.0-6.0	Low
. . . . . .	35+	Weathered sandstone								
Typic Eutroboralfs .	0- 5	Clay loam	CL	A-6	0- 5	100	100	70-80	0.2-2.0	Moderate
. . . .	5-30	Clay	CH	A-7		100	100	75-95	0.2	High
. . . .	30-50	Clay loam	CL or CH	A-6 or A-7		100	100	70-85	0.2-0.6	Moderate to high
. . . .	50+	Shale								
Ordnance	0- 7	Cobbly sandy loam	SM	A-2 or A-4	10-45	90-100	90-100	30-40	2.0-6.0	Low
. . . . . .	7-60	Clay	CH	A-7	0- 5	100	100	70-95	0.2	High
9 Argiboroll-Rock Land										
Aridic Argiborolls										
(fine family)	0- 4	Cobbly clay loam	CL	A-6	15-50	95-100	90-100	70-80	0.2-2.0	Moderate
. . . .	4-20	Clay	CH	A-7	0- 5	95-100	90-100	75-95	0.2	High
. . . .	20-36	Silty clay loam	CL or CH	A-6 or A-7	0-10	95-100	90-100	85-95	0.2-0.6	Moderate to high
. . . .	36+	Weathered shale								
Rock Land		(No estimates made)								
10 Eutroboralf										
Typic Eutroboralfs. .	0- 4	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low
. . . .	4- 8	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
. . . .	8-60	Clay	CH	A-7		100	100	75-95	0.2	High
Mollic Eutroboralfs .	0- 7	Sandy clay loam	ML	A-4		75-100	70-100	50-60	0.2-0.6	Low
. . . .	7-29	Clay loam	CL	A-6		75-100	70-100	60-80	0.2-0.6	Moderate
. . . .	29-50	Clay	CH	A-7		100	100	75-95	0.2	High
. . . .	50-60	Sandy clay	CL	A-7		100	100	45-60	0.2	High
Rock Land		(No estimates made)								
11 Argiboroll-Haploboroll										
Aridic Argiborolls . .	0- 4	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
. . . .	4-16	Silty clay	CH	A-7		100	100	90-95	0.2	High
. . . .	16-30	Silty clay loam	CH	A-7		100	100	85-95	0.2-0.6	Moderate
. . . .	30+	Shale								
Aridic Argiborolls,										
shallow	0- 4	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
. . . . . .	4-15	Clay	CH	A-7		100	100	75-95	.06-0.2	High
. . . . . .	15+	Shale								
Aridic Haploborolls .	0-18	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
. . . .	18+	Shale								
12 Eutroboralf-Haploboroll										
Typic Eutroboralfs. .	0- 7	Sandy loam	SM	A-2 or A-4		95-100	95-100	30-45	2.0-6.0	Low
. . . .	7-18	Sandy clay loam	SC	A-6		95-100	95-100	35-45	0.6-2.0	Low to moderate
. . . .	18-30	Sandy loam	SM	A-2 or A-4		95-100	95-100	30-45	2.0-6.0	
. . . .	30+	Tuff								
Lithic Haploborolls .	0-13	Sandy loam	SM	A-2 or A-4		95-100	95-100	30-45	2.0-6.0	Low
. . . .	13+	Hyolite								
Rock Land		(No estimates made)								

6

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	inches				percent				in/hr	
13 Chimayo-Mirabal-Supervisor										
Chimayo	0- 6	Stony loam	ML	A-4	15-25	90-100	75-85	35-45	0.6-2.0	Low
. . . . . .	6-18	Cobbly loam	ML	A-4	25-35	85-95	60-85	30-45	0.6-2.0	Low
. . . . . .	18+	Granite, gneiss and schist								
Mirabal	0-22	Very stony loam	SM	A-1 or A-2	40-70	70-95	65-90	20-35	2.0-6.0	Low
. . . .	22+	Granite and gneiss								
Supervisor.	0-10	Gravelly sandy loam	SM	A-2	5-15	90-100	75-85	25-35	2.0-6.0	Low
. . . . . .	10-23	Very gravelly loamy sand								
. . . . . .	23+	Granite, gneiss and schist								
14 Etown-Angostura										
Etown	0- 9	Stony loam	SM	A-4	15-25	75-85	70-85	35-50	0.6-2.0	Low
. . . .	9-18	Stony clay loam	SM	A-4	25-40	60-70	60-70	35-50	0.2-0.6	Moderate
. . . .	18-60	Very stony clay loam	SM	A-2	50-75	70-80	35-45	25-35	0.2-2.0	Low
Angostura.	0-12	Gravelly sandy loam	SM	A-1 or A-2	15-35	60-70	65-80	15-30	0.6-2.0	Low
. . . . . .	12-54	Stony sandy clay loam	GM	A-1	35-50	40-50	55-65	15-25	0.6-2.0	Low to moderate
. . . . . .	54-70	Stony sandy loam	GM	A-1	50-75	35-45	35-45	10-20	2.0-6.0	Low
Loberg-like	0-10	Stony loam	SM	A-4	15-30	75-85	70-85	35-50	0.6-2.0	Low
. . . . .	10-20	Stony clay loam	GM or GC	A-4 or A-6	25-40	60-70	60-70	40-60	0.2-0.6	Moderate
. . . . .	20-60	Very stony clay loam	GM	A-2	40-75	45-55	35-45	25-35	0.6-2.0	Low
15 Nambe-Cundiyo										
Nambe	0- 8	Gravelly loam	SM	A-4	5-15	80-90	60-70	40-50	2.0-6.0	Low
. . . .	8-60	Gravelly sandy loam	SM	A-2	25-35	75-85	65-75	25-35	2.0-6.0	Low
Cundiyo	0- 6	Gravelly sandy loam	SM	A-2	0- 5	85-95	75-85	25-35	2.0-6.0	Low
. . . . . .	6-20	Stony sandy loam	SM	A-2	20-30	95-100	90-100	30-35	2.0-6.0	Low
. . . . . .	20-33	Gravelly sandy loam	SM	A-2	20-30	95-100	90-100	30-35	2.0-6.0	Low
. . . . . .	33-60	Gravelly sandy loam	SM	A-2 or A-1	25-35	75-85	60-75	20-30	2.0-6.0	Low
16 Rock Land-Rough Broken Land										
Rock Land		(No estimates made)								
Rough Broken Land .		(No estimates made)								
17 Cryoboralf										
Typic Cryoboralfs . .	0- 9	Sandy loam	SM	A-4	5-10	75-90	70-85	35-45	2.0-6.0	Low
. . . .	9-50	Sandy clay loam	SC	A-6	10-20	75-90	75-90	35-45	0.6-2.0	Low to moderate
. . . .	50+	Bedrock								
Lithic Cryoboralfs . .	0-13	Sandy loam	SM	A-2 or A-4		95-100	95-100	30-45	2.0-6.0	Low
. . . .	13+	Bedrock								
Rock Land		(No estimates made)								
18 Brycan-Ustifluvent										
Brycan	0-16	Loam	ML or CL	A-4 or A-6		95-100	95-100	60-75	0.6-2.0	Low
. . . .	16-40	Clay loam	CL	A-6 or A-7		95-100	95-100	70-80	0.2-0.6	Moderate
. . . .	40-60	Sandy clay loam	CL or ML	A-6		95-100	95-100	55-65	0.6-2.0	Low to moderate

Typic Ustifluvents	0-30	Stratified loam and sandy clay loam	ML or SC	A-4 or A-6		100	100	35-75	0.6-2.0	Low to moderate
	30+	Sand and gravel or very gravelly sandy loams	SM or GM	A-1 or A-2		50-75	45-70	15-35	6.0	Low
Gabaldon	0-16	Loam	ML or CL	A-4		85-100	75-100	60-75	0.6-2.0	Low
	16-60	Heavy loam	CL	A-6		85-100	75-100	65-85	0.6-2.0	Moderate
Shanta	0-23	Loam	CL or ML	A-4	0-10	90-100	90-100	55-70	0.6-2.0	Low
	23-50	Light sandy clay loam	CL or ML	A-4	0-10	90-100	90-100	50-65	0.6-2.0	Low to moderate
	50-60	Sand and gravel	SW-SM or SM	A-1 or A-2	0-10	75-95	70-90	5-15	6.0	Low
19 Fernando-Basalt Rock Land										
Fernando	0- 6	Loam	ML	A-4 or A-6		100	100	55-75	0.6-2.0	Low
	6-29	Heavy clay loam	CL	A-6		100	100	75-85	0.2-0.6	Moderate
	29-60	Light clay loam	ML or CL	A-4 or A-6		100	100	75-85	0.2-2.0	Low
Basalt Rock Land		(No estimates made)								
Dormilon	0-15	Stony loam	SM or ML	A-4	15-20	75-90	70-85	45-65	0.6-2.0	Low
	15+	Basalt bedrock								
20 Los Alamos-Bidman-Millett										
Los Alamos	0- 5	Sandy loam	SM	A-2 or A-4		100	100	30-40	2.0-6.0	Low
	5-14	Clay loam	CL	A-6		100	100	70-80	0.2-2.0	Moderate
	14-25	Loam	ML	A-4		85-95	80-90	55-75	0.6-2.0	Low
	25-40	Gravelly sandy loam	SM	A-2	0- 5	65-85	60-80	20-30	2.0-6.0	Low
	40+	Pumice and ash								
Bidman	0- 5	Gravelly fine sandy loam	SM	A-2 or A-4		70-85	65-80	30-50	0.6-2.0	Low
	5-16	Clay and silty clay loam	CL or CH	A-6 or A-7		100	100	75-95	0.2-0.6	Moderate to high
	16-30	Gravelly loam	ML	A-4	0- 5	70-85	65-80	50-65	0.6-2.0	Low
	30-60	Gravelly sandy loam	SM	A-2	0- 5	65-85	60-80	20-30	2.0-6.0	Low
Millett	0-18	Gravelly sandy clay loam	SM or SC	A-4	0- 5	85-95	70-85	35-45	0.6-2.0	Low
	18-40	Very gravelly sandy clay loam	GM	A-2	0- 5	35-50	35-50	25-35	0.6-2.0	Low to moderate
21 Majada-Calabasas-Apache										
Majada	0- 7	Cobbly fine sandy loam	SM	A-4	15-25	95-100	90-100	40-50	2.0-6.0	Low
	7-14	Very cobbly sandy clay loam	SC	A-6	40-70	95-100	90-100	35-50	0.6-2.0	Low
	14-19	Very cobbly sandy clay	CH or SC	A-7	40-70	95-100	95-100	40-55	0.2	Moderate
	19-30	Very cobbly sandy clay loam	SC	A-6	40-70	95-100	90-100	35-50	0.6-2.0	Low to moderate
	30-40	Very cobbly loam	ML or CL	A-4	65-70	95-100	90-100	60-75	0.6-2.0	Low
Calabasas	0-21	Loam	CL	A-6		100	100	75-90	0.6-2.0	Low to moderate
	21-32	Clay loam	CL	A-6		100	100	80-90	0.2-0.6	Moderate
	32-44	Heavy loam	CL	A-6		100	100	80-90	0.6-2.0	Moderate
	44-53	Loam	ML	A-4		100	100	65-80	0.6-2.0	Low
Apache	0- 9	Stony fine sandy loam	SM	A-4	25-35	95-100	95-100	40-50	2.0-6.0	Low
	9-16	Stony loam	CL	A-6	10-20	95-100	90-100	50-60	0.6-2.0	Low to moderate
22 Fernando-Hagerman-Bidman										
Fernando	0- 6	Loam	ML	A-4 or A-6		100	100	55-75	0.6-2.0	Low
	6-29	Heavy clay loam	CL	A-6		100	100	75-85	0.2-0.6	Moderate
	29-60	Light clay loam	ML or CL	A-4 or A-6		100	100	75-85	0.2-2.0	Low
Hagerman	0- 5	Loam and fine sandy loam	ML	A-4		100	100	50-75	0.6-2.0	Low
	5-30	Sandy clay loam	CL	A-6		100	100	50-70	0.6-2.0	Low to moderate
	30+	Sandstone bedrock								
Bidman	0- 5	Gravelly fine sandy loam	SM	A-2 or A-4		70-85	65-80	30-50	0.6-2.0	Low
	5-16	Clay and silty clay loam	CL or CH	A-6 or A-7		100	100	75-95	0.2-0.6	Moderate to high
	16-30	Gravelly loam	ML	A-4	0- 5	70-85	65-80	50-65	0.6-2.0	Low
	30-60	Gravelly sandy loam	SM	A-2	0- 5	65-85	60-80	20-30	2.0-6.0	Low

Soil Map Symbol and Soil Association	Depth from Surface	Classification: USDA texture	Classification: Unified	Classification: AASHO	Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve-- No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)	Range in Permeability	Shrink-swell Potential
	inches				percent				in/hr	
23 Las Lucas-Litle-Persayo										
Las Lucas	0- 5	Loam	ML	A-6 or A-4		100	100	60-80	0.6-2.0	Moderate
. . . . . .	5-26	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate
. . . . . .	26-50	Light silty clay loam	CL	A-6		100	100	80-95	0.2-0.6	Moderate
. . . . . .	50+	Shale								
Litle	0- 6	Silty clay loam	CL	A-6		100	100	85-100	0.2-0.6	Moderate to high
. . . .	6-28	Clay	CL or CH	A-7		100	100	90-100	0.2	High
. . . .	28+	Shale								
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
. . . .	12+	Shale								
24 Dormilon-Stoneham-Harvey										
Dormilon	0-15	Stony loam	SM or ML	A-4	15-20	75-90	75-85	45-65	0.6-2.0	Low
. . . . . .	15+	Basalt bedrock								
Stoneham	0- 8	Cobbly loam	CL or ML	A-6 or A-4	10-15	85-95	80-90	50-75	0.6-2.0	Moderate
. . . . . .	8-60	Light clay loam and cobbly clay loam	CL	A-6	15-20	75-90	70-85	60-80	0.6-2.0	Moderate
Harvey	0-12	Loam	ML or CL	A-4 or A-6		100	100	50-60	0.6-2.0	Low
. . . .	12-27	Clay loam	CL	A-6		100	100	70-80	0.6-2.0	Moderate
. . . .	27-60	Sandy clay loam (limy)	ML or CL	A-4 or A-6		100	100	50-60	0.6-2.0	Low to moderate
25 Pojoaque-Rough Broken Land										
Pojoaque	0- 7	Sandy clay loam	SC	A-6		95-100	90-100	35-50	0.6-2.0	Low to moderate
. . . . . .	7-25	Gravelly sandy clay loam	SC or SM	A-2 or A-4		80-90	70-80	25-40	0.6-2.0	Low to moderate
. . . . . .	25-60	Sandy clay loam	SC	A-6		90-100	80-90	35-45	0.6-2.0	Low to moderate
Rough Broken Land		(No estimates made)								
26 Penistaja-Valent										
Penistaja	0- 5	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
. . . . . .	5-30	Sandy clay loam	CL	A-6		100	100	50-75	0.6-2.0	Low to moderate
. . . . . .	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.6-2.0	Low
Valent	0-10	Loamy sand	SM	A-2		100	100	15-30	6.0	Low
. . . .	10-60	Fine sand and loamy sand	SM or SP-SM	A-2 or A-3		100	100	5-30	6.0	Low
27 Green River-El Rancho-Werlow										
Green River soils. . .	0-60	Loam (stratified)	ML or CL	A-4		100	100	50-70	0.6-2.0	Low
El Rancho soils . . .	0-60	Sandy clay loam	SC	A-6		100	100	35-50	0.6-2.0	Low to moderate
Werlow	0- 7	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low to moderate
. . . .	7-15	Fine sandy loam	SM	A-4		100	100	35-50	2.0-6.0	Low
. . . .	15-50	Loam	ML	A-4		100	100	55-75	0.6-2.0	Low to moderate
. . . .	50-60	Very gravelly sand	GP-GM or GM	A-1	0- 5	25-45	15-35	5-20	6.0	Low
Fruitland	0-13	Sandy clay loam	SC	A-6		100	100	35-45	0.6-2.0	Low to moderate
. . . . . .	13-60	Fine sandy loam	SM	A-2 or A-4		100	100	25-50	2.0-6.0	Low



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T29N
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N
SCALE IN MILES
0 1 2 3 4 5
Soil Associations
1 Persayo-Farb
2 Werlow-Fruitland-Turley
3 Doak-Shiprock
4 Shiprock-Sheppard
5 Hilly Gravelly Land
6 Badland-Rock Land
7 Turley-Badland
8 Rock Land-Billings
9 Comborthid-Farb
10 Persayo-Billings
11 Persayo-Rock Land
12 Chipeta-Sheppard-Shiprock
13 Rock Land-Torriorthent
14 Travessilla-Rock Land
15 Del Rio-Silver
16 La Fonda-Del Rio
17 Travessilla-Malposa-Rock Land
18 Vamer-Rock Land
Miscellaneous (Navajo Reservoir, etc.)

Fig. 1. General Soil Map of San Juan County, New Mexico

Engineering soil groups and estimated soil properties, San Juan County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO	No. 4 (4.7mm)	No.10 (2.0mm)	No. 200 (0.074mm)		
1 Persayo-Farb									
Persayo	0-12	Silty clay loam	CL	A-6 or A-7	100	100	70-90	0.2-0.6	Moderate
Farb*	0-14	Sandy loam	SM or ML	A-4	85-95	80-90	45-60	2.0-6.0	Low
Sundown	0-15	Loamy sand	SM	A-3 or A-2	100	100	15-25	> 6.0	Low
	15-29	Sand	SP-SM	A-3 or A-2	100	100	5-15	> 6.0	Low
	29-49	Gravelly sand	SW	A-3 or A-2	70-80	60-70	1-10	> 6.0	Low
	49-60	Sand	SP-SW	A-3 or A-2	100	100	5-15	> 6.0	Low
2 Werlow-Fruitland-Turley									
Werlow	0- 7	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	7-12	Fine sandy loam	SM	A-4	100	100	35-50	0.6-2.0	Low
	12-60	Loam	ML or CL	A-4	100	100	55-75	0.6-2.0	Low
Fruitland	0-60	Sandy loam	SM	A-2-4 or A-4	100	100	25-50	2.0-6.0	Low
Turley	0-60	Clay loam	CL or CH	A-6	100	100	70-90	0.2-0.6	Moderate to high
Azfield	0-60	Loam	ML	A-4	100	100	45-75	0.6-2.0	Low
3 Doak-Shiprock									
Doak	0- 5	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	5-17	Clay loam	CL	A-6	100	100	75-90	0.6-2.0	Moderate
	17-60	Clay loam	CL	A-6	100	100	70-90	0.6-2.0	Low
Shiprock	0- 4	Fine sandy loam	SM	A-4	100	100	35-50	2.0-6.0	Low
	4-13	Sandy clay loam	ML	A-4	100	100	45-55	0.6-2.0	Low
	13-60	Fine sandy loam	SM	A-2-4	100	100	25-35	2.0-6.0	Low
Grandview	0-39	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	39-60	Very fine sandy loam	ML	A-4	100	100	45-60	0.6-2.0	Low
4 Shiprock-Sheppard									
Shiprock	0- 4	Fine sandy loam	SM	A-4	100	100	35-50	2.0-6.0	Low
	4-13	Sandy clay loam	ML	A-4	100	100	45-55	0.6-2.0	Low
	13-60	Fine sandy loam	SM	A-2-4	100	100	25-35	2.0-6.0	Low
Sheppard	0-60	Loamy sand	SM or SP-SM	A-3 or A-2	100	100	5-20	2.0-10	Low
Nageesi	0-12	Sandy loam	SM	A-2-4	100	100	25-40	2.0-6.0	Low
	12-28	Fine sandy loam (limy)	SM	A-4	100	100	35-60	0.6-2.0	Low
	28-44	Sandy loam	SM	A-2-4	100	100	25-40	2.0-6.0	Low
	44-60	Loamy sand	SM	A-1-6	100	100	10-25	> 6.0	Low
5 Hilly-Gravelly Land									
Hilly-Gravelly land		(No estimates made)							
Doak	0- 5	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	5-17	Clay loam	CL	A-6	100	100	75-90	0.6-2.0	Moderate
	17-60	Clay loam	CL	A-6	100	100	70-90	0.6-2.0	Low
6 Badland-Rock Land									
Badland		(No estimates made)							
Persayo	0-12	Silty clay loam	CL	A-6 or A-7	100	100	70-90	0.2-0.6	Moderate
7 Turley-Badland									
Turley	0-60	Clay loam	CL or CH	A-6	100	100	70-90	0.2-0.6	Moderate
Azfield	0-60	Loam	ML	A-4	100	100	45-75	0.6-2.0	Low
8 Rock Land-Billings									
Billings	0-60	Silty clay loam	CL or ML-CL	A-6 or A-7	100	100	75-90	0.2-0.6	Moderate
Christianburg-like	0-60	Clay	CH	A-7	100	100	75-95	< 0.2	High
	0-14	Fine sandy loam	SM	A-4	90-95	80-90	45-55	2.0-6.0	Low
9 Camborthid-Farb									
Typic Camborthids.	0- 4	Fine sandy loam	SM or ML	A-4	100	100	45-55	2.0-6.0	Low
	4-25	Very fine sandy loam	ML	A-4	100	100	50-75	1.5-2.0	Low
Farb*	0-14	Fine sandy loam	SM or ML	A-4	90-95	80-90	45-60	2.0-6.0	Low
10 Persayo-Billings									
Persayo	0-12	Silty clay loam	CL	A-6 or A-7	100	100	70-90	0.2-0.6	Moderate
Billings	0-60	Silty clay loam	CL or ML-CL	A-6 or A-7	100	100	75-90	0.2-0.6	Moderate
Christianburg-like	0-60	Clay	CH	A-7	100	100	75-95	< 0.2	High

11 Persayo-Rock Land									
Persayo	0-12	Silty clay loam	CL	A-6 or A-7	100	100	70-90	0.2-0.6	Moderate
Typic Camborthids.	0- 4	Fine sandy loam	SM or ML	A-4	100	100	45-55	2.0-6.0	Low
	4-25	Very fine sandy loam	ML	A-4	100	100	50-75	1.5-2.0	Low
12 Chipeta-Sheppard-Shiprock									
Chipeta	0-15	Clay	CH	A-7	100	100	75-90	< 0.2	High
Sheppard	0-60	Loamy sand	SM or SP-SM	A-3 or A-2	100	100	5-20	2.0-10.	Low
Shiprock	0- 4	Fine sandy loam	SM	A-4	100	100	35-50	2.0-6.0	Low
	4-13	Sandy clay loam	ML	A-4	100	100	45-55	0.6-2.0	Low
	13-60	Fine sandy loam	SM	A-2-4	100	100	25-35	2.0-6.0	Low
13 Rock Land-Torriorthent									
Rock Land		(No estimates made)							
Lithic Torriorthents	0- 4	Gravelly loam	ML	A-4	75-95	70-90	55-75	0.6-2.0	Low
	4- 7	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	7-15	Clay loam	CL	A-6	100	100	70-80	0.6-2.0	Moderate
14 Travessilla-Rock Land									
Travessilla*	0-15	Sandy loam	SM	A-4 or A-2-4	90-95	80-90	25-50	2.0-6.0	Low
Ustic Torriorthents	0-15	Silty clay loam	CL	A-6 or A-7	100	100	70-90	0.2-0.6	Moderate
Del Rio	0- 7	Loam	ML	A-4	100	100	75-90	0.6-2.0	Low
	7-37	Clay loam	CL	A-6	100	100	75-90	0.2-0.6	Moderate
	37-60	Clay loam	CL	A-6	100	100	70-85	0.6-2.0	Moderate
15 Del Rio-Silver									
Del Rio	0- 7	Loam	ML	A-4	100	100	75-90	0.6-2.0	Low
	7-37	Clay loam	CL	A-6	100	100	75-90	0.2-0.6	Moderate
	37-60	Clay loam	CL	A-6	100	100	70-85	0.6-2.0	Moderate
Silver	0- 8	Loam	ML	A-4	100	100	70-90	0.6-2.0	Low
	8-30	Silty clay loam or clay	CH or MH	A-7	100	100	75-95	0.2-0.6	High
	30-60	Clay loam	CL	A-6	100	100	70-80	0.2-0.6	Low
Travessilla	0-15	Sandy loam	SM	A-4 or A-2-4	90-95	80-90	25-50	2.0-6.0	Low
16 La Fonda-Del Rio									
La Fonda	0- 4	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	4-16	Heavy loam	ML-CL	A-4	100	100	60-80	0.2-2.0	Low-Moderate
	16-60	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
Del Rio	0- 7	Loam	ML	A-4	100	100	75-90	0.6-2.0	Low
	7-37	Clay loam	CL	A-6	100	100	75-90	0.2-0.6	Moderate
	37-60	Clay loam	CL	A-6	100	100	70-85	0.6-2.0	Moderate
17 Travessilla-Malposa-Rock Land									
Travessilla	0-15	Sandy loam	SM	A-4 or A-2-4	90-95	80-90	50-75	2.0-6.0	Low
Malposa*	0- 5	Stony loam	LM or SM	A-4	60-70	40-60	50-75	0.6-2.0	Low
	5-16	Stony clay loam	CL	A-6	70-85	60-70	50-75	0.2-0.6	Moderate
	16-30	Stony loam	ML or CL	A-4 or A-6	60-75	40-60	50-75	0.6-2.0	Low
18 Vamer-Rock Land									
Vamer*	0- 4	Loam and cobbly loam	ML	A-4	100	90-100	50-75	0.6-2.0	Low
	4-15	Clay	CH	A-7	100	100	75-95	< 0.2	High
	15+	Sandstone							
Typic Eutroboralfs, steep phase	0-11	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	11-25	Loamy fine sand	SM	A-2	100	100	15-25	> 6.0	Low
	25-30	Sandy clay loam	ML or CL	A-4 or A-6	100	100	35-60	0.6-2.0	Low-Moderate
	30-60	Very fine sandy loam	SM or ML	A-4	100	100	45-60	0.6-2.0	Low
Typic Eutroboralfs, gently sloping	0-24	Loam	ML	A-4	100	100	60-75	0.6-2.0	Low
	24-30	Very fine sandy loam	SM or ML	A-4	100	100	45-60	0.6-2.0	Low
	30-36	Sandy clay loam	ML or CL	A-4 or A-6	100	100	35-50	0.6-2.0	Low
	36-60	Very fine sandy loam	SM or ML	A-4	100	100	45-60	0.6-2.0	Low

*These soils usually contain coarse fragments greater than 3 inches.

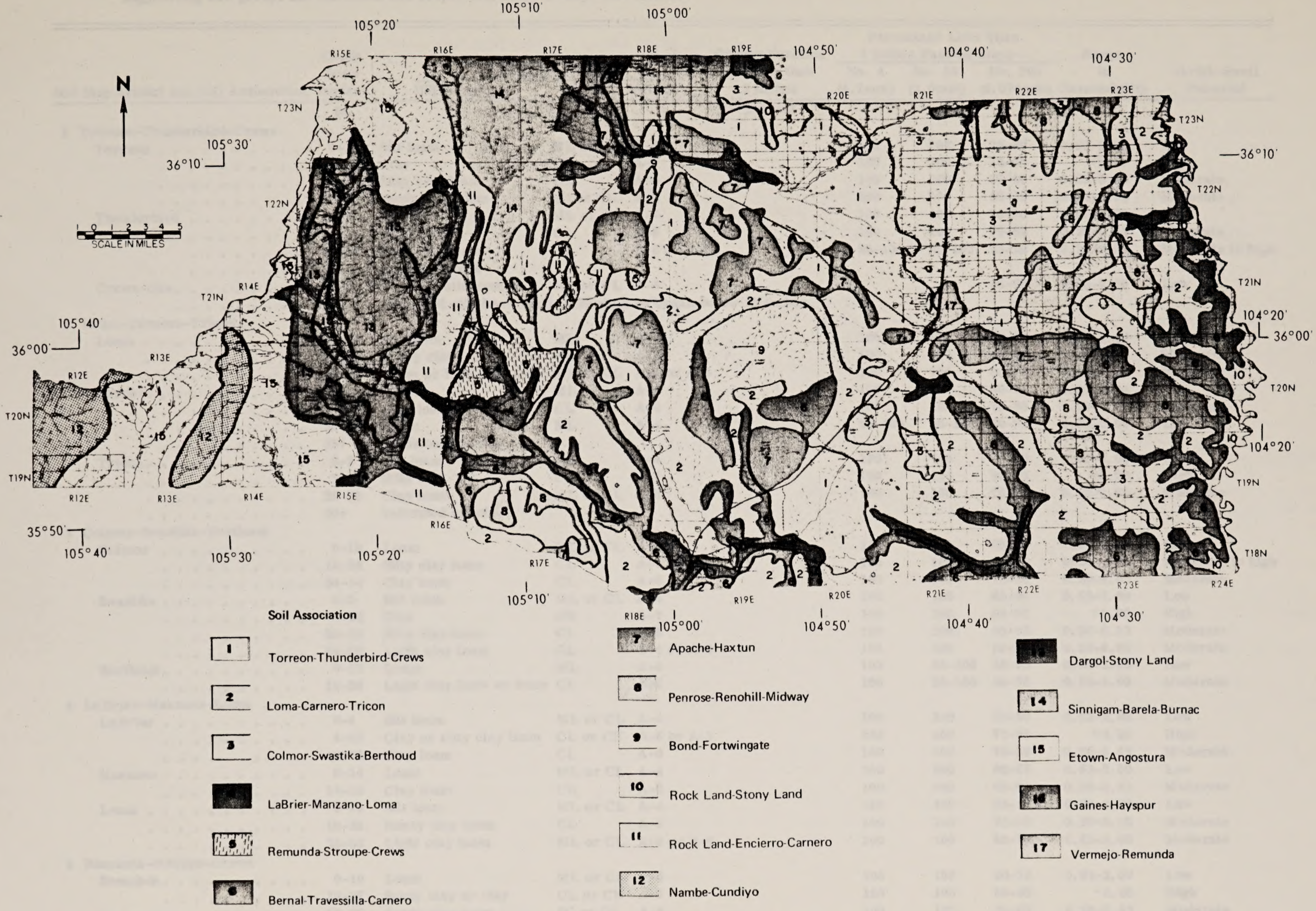

N
SCALE IN MILES
0 1 2 3 4 5
105°40'
105°30'
105°20'
105°10'
105°00'
104°50'
104°40'
104°30'
104°20'
36°10'
36°00'
35°50'
R12E
R13E
R14E
R15E
R16E
R17E
R18E
R19E
R20E
R21E
R22E
R23E
R24E
T23N
T22N
T21N
T20N
T19N
T18N
Soil Association
1 Torreon-Thunderbird-Crews
2 Loma-Carnero-Tricon
3 Colmor-Swastika-Berthoud
4 LaBrier-Manzano-Loma
5 Remunda-Stroupe-Crews
6 Bernal-Travessilla-Carnero
7 Apache-Haxtun
8 Penrose-Renohill-Midway
9 Bond-Fortwingate
10 Rock Land-Stony Land
11 Rock Land-Encierro-Carnero
12 Nambe-Cundiyo
13 Dargol-Stony Land
14 Sinnigam-Barela-Burnac
15 Etown-Angostura
16 Gaines-Hayspur
17 Vermejo-Remunda

Figure 1. General soil map of Mora County, New Mexico

Engineering soil groups and estimated soil properties, Mora County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less Than 3 Inches Passing Sieve--			Range in Permeability	Shrink-Swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.				percent				in/hr	
1 Torreon-Thunderbird-Crews										
Torreon	0-10	Silt loam	ML or CL	A-4		100	100	70-90	0.63-2.00	Low
	10-31	Clay	CH	A-7		100	100	75-95	<0.20	High
	31-42	Silty clay loam	CL	A-6		100	100	85-95	0.20-0.63	Moderate
	42-56	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.20-0.63	Moderate
Thunderbird	0-12	Silt loam	ML or CL	A-4		100	100	70-90	0.63-2.00	Low
	12-27	Clay loam	CL	A-6		100	100	70-80	0.20-0.63	Moderate
	27-42	Silty clay loam	CL	A-6 or A-7		95-100	95-100	85-95	0.20-0.63	Moderate to high
	42+	Basalt bedrock								
Crews-like	0-14	Loam or silt loam	ML or CL	A-4				65-90	0.63-2.00	Low
	14+	Indurated caliche--usually underlain by basalt below 20 inches								
2 Loma-Carnero-Tricon										
Loma	0-11	Silt loam	ML	A-4		100	100	65-90	0.63-2.00	Low
	11-35	Heavy clay loam	CL	A-6		100	100	70-90	0.20-0.63	Moderate
	35-56	Loam or light clay loam	ML or CL	A-4 or A-6		100	100	60-75	0.63-2.00	Moderate
Carnero	0-5	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low
	5-30	Clay loam	CL	A-6		100	100	70-85	0.20-0.63	Moderate
	30-35	Loam	ML	A-4		95-100	95-100	60-75	0.63-2.00	Low
	35+	Sandstone bedrock								
Tricon	0-7	Silt loam	ML	A-4		100	100	65-90	0.63-2.00	Low
	7-20	Silty clay	CH	A-7		100	100	90-95	<0.20	High
	20-30	Clay loam	ML or CL	A-6		100	100	70-80	0.20-0.63	Moderate
	30+	Indurated caliche								
3 Colmor-Swastika-Berthoud										
Colmor	0-10	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	10-34	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate to high
	34-54	Clay loam	CL	A-6		100	100	70-80	0.20-0.63	Moderate
Swastika	0-5	Silt loam	ML or CL	A-4		100	100	65-90	0.63-2.00	Low
	5-22	Clay	CH	A-7		100	100	85-95	<0.20	High
	22-34	Silty clay loam	CL	A-6		100	100	85-95	0.20-0.63	Moderate
	34-60	Light clay loam	CL	A-4 or A-6		100	100	35-55	0.20-0.63	Moderate
Berthoud	0-12	Loam	ML	A-4		100	95-100	60-75	0.63-2.00	Low
	12-50	Light clay loam or loam	CL	A-6		100	95-100	60-75	0.63-2.00	Moderate
4 LaBrier-Manzano-Loma										
LaBrier	0-4	Silt loam	ML or CL	A-4		100	100	70-90	0.63-2.00	Low
	4-40	Clay or silty clay loam	CL or CH	A-6 or A-7		100	100	75-95	<0.20	High
	40-60	Clay loam	CL	A-6		100	100	70-80	0.20-0.63	Moderate
Manzano	0-14	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	14-55	Clay loam	CL	A-6		100	100	60-80	0.20-0.63	Moderate
Loma	0-10	Silt loam	ML or CL	A-4		100	100	65-90	0.63-2.00	Low
	10-35	Heavy clay loam	CL	A-6		100	100	70-90	0.20-6.30	Moderate
	35-55	Light clay loam	ML or CL	A-4 or A-6		100	100	60-75	0.63-2.00	Moderate
5 Remunda-Stroupe-Crews										
Remunda	0-10	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	10-37	Sandy clay or clay	CL or CH	A-7		100	100	60-95	<0.20	High
	37-60	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.20-0.63	Moderate
Stroupe-like	0-9	Cobbly sandy clay loam	GM	A-4	15 to 35	45-60	45-60	30-40	0.63-2.00	Low to moderate
	9-33	Gravelly clay	GC	A-6	35 to 45	75-85	70-85	50-60	<0.20	Moderate to high
	33-60	Clay	CH	A-7	0 to 5	95-100	95-100	75-95	<0.20	Moderate to high
Crews-like	0-10	Cobbly loam	GM	A-2	50 to 65	25-45	25-45	20-30	0.63-2.00	Low
	10+	Caliche over interbedded shale and sandstone								

6 Bernal-Travessilla-Carnero										
Bernal	0-3	Fine sandy loam	ML or SM	A-4		100	100	50-75	0.63-2.00	Low
	3-12	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.20-0.63	Low to moderate
	12+	Sandstone bedrock								
Travessilla	0-7	Stony loam	GM or GC	A-2	15 to 40	85-95	75-85	35-50	0.63-2.00	Low
	7+	Sandstone bedrock								
Carnero	0-5	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	5-30	Clay loam	CL	A-6		100	100	70-85	0.20-0.63	Moderate
	30+	Sandstone bedrock								
7 Apache-Haxtun										
Apache	0-15	Stony loam	GM	A-4	15 to 20	75-90	75-85	45-65	0.63-2.00	Low
	15+	Basalt bedrock								
Haxtun-like	0-6	Stony loam	GM	A-4	15 to 20	80-90	80-90	50-65	0.63-2.00	Low
	6-30	Stony clay loam	GC	A-6	15 to 20	80-90	80-90	55-70	0.20-0.63	Moderate
	30+	Basalt bedrock								
8 Penrose-Renohill-Midway										
Penrose	0-10	Loam	ML or CL	A-4	10 to 15	85-95	85-95	50-65	0.63-2.00	Low
	10-16	Clay loam	CL	A-6	5 to 10	95-100	95-100	70-80	0.20-0.63	Moderate
Renohill	0-8	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	8-30	Silty clay loam	CL	A-6 or A-7		100	100	75-95	0.20-0.63	Moderate to high
	30+	Shale								
Midway	0-12	Loam to clay loam	ML or CL	A-4 or A-6		100	100	60-80	0.63-2.00	Moderate
	12+	Shale								
9 Bond-Fortwingate										
Bond	0-5	Stony loam	ML or CL	A-4	15 to 20	80-90	80-90	50-65	0.63-2.00	Low
	5-12	Sandy clay loam	SC or CL	A-6		95-100	95-100	35-55	0.63-2.00	Low to moderate
	12+	Sandstone bedrock								
Fortwingate	0-10	Stony loam	GM or ML	A-4	15 to 20	85-90	80-90	50-65	0.63-2.00	Low
	10-30	Clay or sandy clay	CL or CH	A-6 or A-7	0 to 5	95-100	95-100	65-95	0.20-0.63	Moderate to high
	30+	Sandstone								
10 Rockland-Stony Land										
Rockland and Stony Land	(No estimates made)									
11 Rockland-Encierro-Carnero										
Rockland	(No estimates made)									
Encierro	0-6	Stony silty clay loam	GM or GC	A-4 or A-6	15 to 30	67-75	65-75	55-70	0.63-2.00	Low to moderate
	6-14	Silty clay	CH	A-7	0 to 10	95-100	95-100	85-95	< 0.20	High
	14-18	Gravelly silty clay loam	GM or GC	A-4 or A-6	25 to 40	55-65	55-65	50-60	0.63-2.00	Low to moderate
	18+	Interbedded sandstone and shale								
Carnero-like	0-8	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	8-45	Sandy clay loam	CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
	45-60	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
12 Nambe-Cundiyo										
Nambe	0-8	Gravelly loam	ML	A-4	5 to 15	80-90	60-70	40-50	0.63-2.00	Low
	8-60	Gravelly sandy loam	SM	A-2	25 to 35	85-95	65-75	20-30	2.00-6.30	Low
Cundiyo	0-6	Gravelly sandy loam	SM	A-2	0 to 5	85-95	75-85	25-35	2.00-6.30	Low
	6-20	Sandy loam	SM	A-2	20 to 30	95-100	90-100	30-35	2.00-6.30	Low
	20-33	Gravelly sandy loam	SM	A-2	20 to 30	95-100	90-100	30-35	2.00-6.30	Low
	33-60	Gravelly sandy loam	SM	A-2	25 to 35	75-85	60-75	20-30	2.00-6.30	Low
13 Dargol-Stony Land										
Dargol	0-13	Stony loam	ML or GM	A-4	10 to 25	85-95	80-90	50-65	0.63-2.00	Low
	13-38	Stony clay	CH	A-7	10 to 15	95-100	95-100	75-95	< 0.20	High
Stony Land and Rockland	(No estimates made)									

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Less Than 3 Inches Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.				percent				in/hr	
14 Sinnigam-Barela-Burnac										
Sinnigam-like	0-12	Stony silt loam	GM	A-4	25 to 45	55-65	55-65	40-55	0.63-2.00	Low
	12-18	Stony clay loam	GM	A-2	50 to 75	35-45	35-46	25-35	0.20-0.63	Low
	18+	Basalt bedrock								
Barela	0-4	Silt loam	ML	A-4		100	100	70-90	0.63-2.00	Low
	4-9	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
	9-40	Stony silty clay	GC or CH	A-6 or A-7	20 to 30	75-85	75-85	70-80	< 0.20	High
	40+	Basalt bedrock								
Burnac	0-10	Stony loam	GM	A-4	15 to 25	75-85	75-85	35-50	0.63-2.00	Low
	10-15	Stony clay loam	GM	A-6	15 to 25	75-85	75-85	55-65	0.20-0.63	Moderate
	15-40	Stony clay	GC	A-6	25 to 35	65-75	60-75	50-70	< 0.20	High
	40+	Basalt bedrock								
15 Etown-Angostura										
Etown	0-9	Stony loam	GM	A-4	15 to 25	75-85	70-85	35-65	0.63-2.00	Low
	9-18	Stony clay loam	GM or GC	A-4 or A-6	25 to 40	60-70	60-70	45-55	0.20-0.63	Moderate
	18-60	Very stony clay loam	GM	A-4 or A-2	50 to 75	35-45	35-45	25-35	0.63-2.00	Low
Angostura	0-12	Gravelly sandy loam	GM or GC	A-4	15 to 35	65-80	65-80	25-40	0.63-2.00	Low
	12-54	Stony sandy clay loam	GM	A-4	35 to 50	55-65	55-65	20-35	0.63-2.00	Low to moderate
	54-70	Stony sandy loam	GM	A-2	50 to 75	35-45	35-45	10-20	2.00-6.30	Low
Loberg-like	0-10	Stony loam	GM	A-4	15 to 30	75-85	70-85	35-65	0.63-2.00	Low
	10-20	Stony clay loam	GM or GC	A-4 or A-6	25 to 40	60-70	60-70	45-55	0.20-0.63	Moderate
	20-60	Very stony clay loam	GM	A-4 or A-2	40 to 75	35-45	35-45	25-35	0.63-2.00	Low
16 Gaines-Hayspur										
Gaines	0-7	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
	7-31	Silty clay	CH	A-7		100	100	90-95	< 0.20	High
	31-60	Silty clay loam	CL	A-6 or A-7		100	100	70-80	0.20-0.63	Moderate to high
Hayspur-like	3-6	Loam	ML	A-4		100	100	60-75	0.63-2.00	Low
	6-19	Silty clay loam	CL	A-6 or A-7		100	100	75-95	0.20-0.63	Moderate
	19-34	Sandy clay loam	CL	A-6		100	100	35-55	0.63-2.00	Moderate
	34-60	Silty clay	CH	A-7		100	100	90-95	< 0.20	High
17 Vermejo-Remunda										
Vermejo	0-5	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.20-0.63	Moderate
	5-60	Silty clay	CH	A-7		100	100	90-95	< 0.20	High
Remunda	0-9	Sandy clay loam	CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
	9-29	Sandy clay	CL or CH	A-6 or A-7		100	100	50-65	< 0.20	High
	29-52	Clay	CH	A-7		100	100	75-95	< 0.20	High
	52-60	Sandy clay	CL or CH	A-6 or A-7		100	100	45-60	< 0.20	
Carnero-like	0-8	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low
	8-45	Sandy clay loam	CL	A-6		100	100	35-55	0.63-2.00	Low to moderate
	45-60	Loam	ML or CL	A-4		100	100	60-75	0.63-2.00	Low

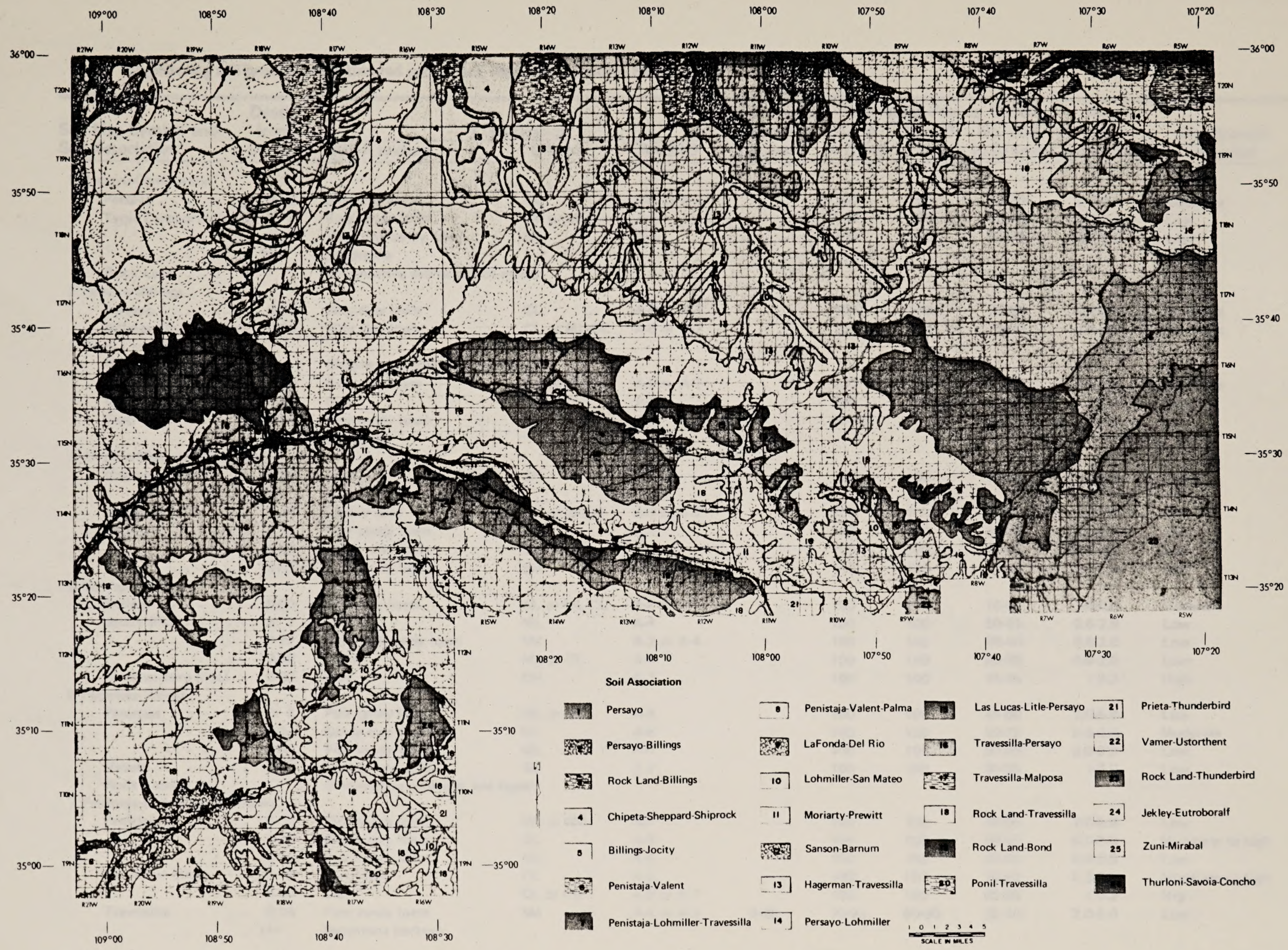

Soil Association
1 Persayo
2 Persayo-Billings
3 Rock Land-Billings
4 Chipeta-Sheppard-Shiprock
5 Billings-Jocity
6 Penistaja-Valent
7 Penistaja-Lohmiller-Travessilla
8 Penistaja-Valent-Palma
9 LaFonda-Del Rio
10 Lohmiller-San Mateo
11 Moriarty-Prewitt
12 Sanson-Barnum
13 Hagerman-Travessilla
14 Persayo-Lohmiller
15 Las Lucas-Litle-Persayo
16 Travessilla-Persayo
17 Travessilla-Malposa
18 Rock Land-Travessilla
19 Rock Land-Bond
20 Ponil-Travessilla
21 Prieta-Thunderbird
22 Vamer-Ustorthent
23 Rock Land-Thunderbird
24 Jekley-Eutroboralf
25 Zuni-Mirabal
26 Thurloni-Savoia-Concho
0 1 2 3 4 5
SCALE IN MILES
109°00
108°50
108°40
108°30
108°20
108°10
108°00
107°50
107°40
107°30
107°20
36°00
35°50
35°40
35°30
35°20
35°10
35°00

Figure 1. General Soil Map of McKinley County, New Mexico

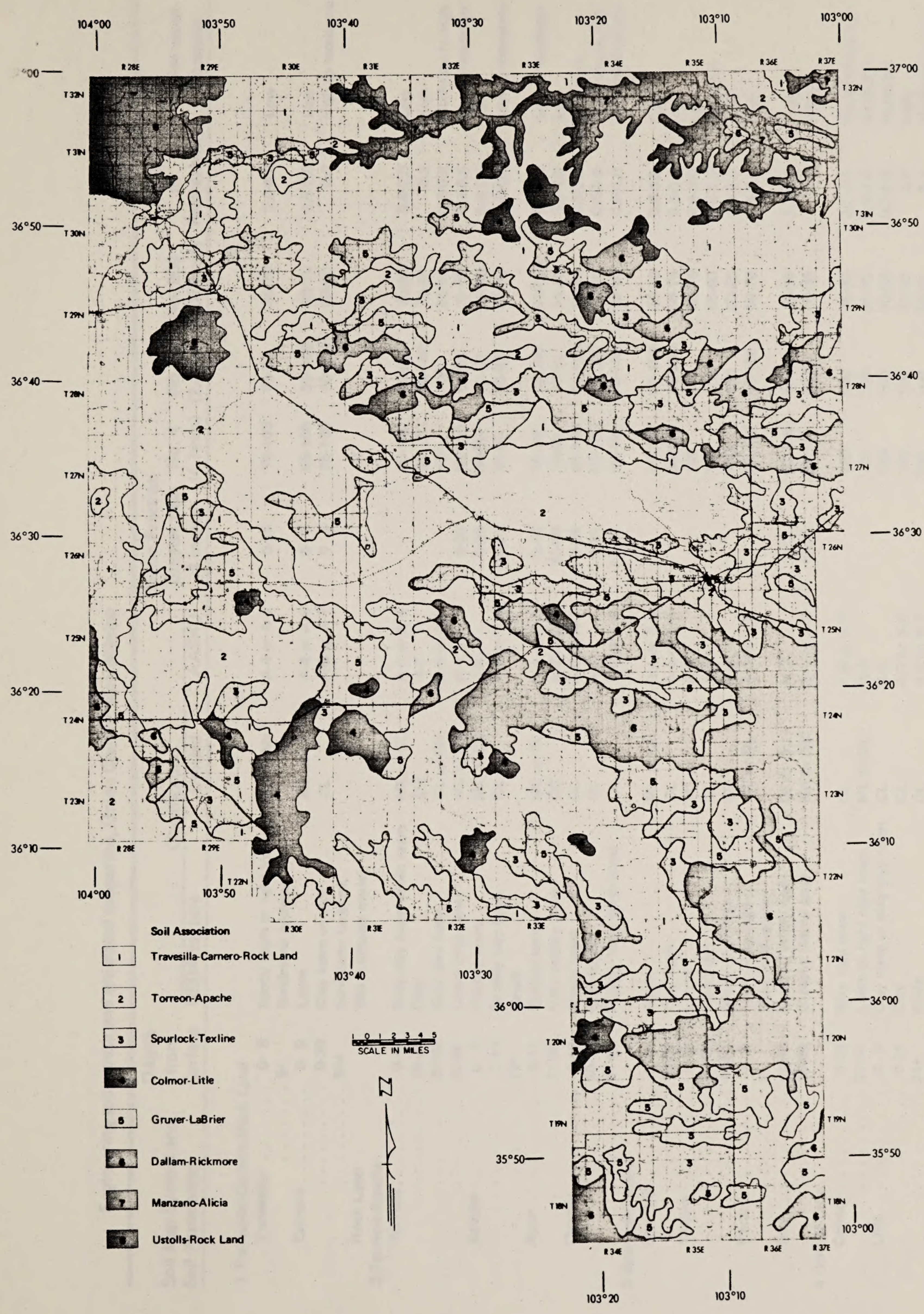
Engineering soil groups and estimated properties, McKinley County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve—			Range in Permeability	Shrink-swell Potential
		USDA texture	United	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
1 Persayo-Camborthid										
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
Typic Camborthids	0- 4	Fine sandy loam	SM or ML	A-4		100	100	45-55	2.0-6.0	Low
	4-25	Very fine sandy loam	ML	A-4		100	100	50-75	0.6-2.0	Low
	25+	Sandstone								
Rock Land		(Engineering estimates not made)								
2 Persayo-Billings										
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
Billings silty clay loam	0-60	Silty clay loam	CL or ML-CL	A-6 or A-7		100	100	75-90	.06-0.6	Moderate
3 Rock Land-Billings										
Rock Land		(Engineering estimates not made)								
Billings	0-60	Silty clay loam	CL or ML-CL	A-6 or A-7		100	100	75-90	.06-0.6	Moderate
Christianburg-like	0-60	Clay	CH	A-7		100	100	75-95	< 0.2	High
Farb	0-14	Fine sandy loam	SM	A-4		90-95	80-90	40-50	2.0-6.0	Low
	14+	Sandstone								
4 Chipeta-Sheppard-Shiprock										
Chipeta	0-15	Clay	CH	A-7		100	100	75-90	< 0.2	High
	15+	Shale								
Sheppard	0-60	Loamy sand	SM or SP-SM	A-3 or A-2		100	100	5-20	2.0-10	Low
Shiprock	0- 4	Fine sandy loam	SM	A-4		100	100	35-50	2.0-6.0	Low
	4-13	Sandy clay loam	SM	A-4		100	100	40-50	0.6-2.0	Low
	13-60	Fine sandy loam	SM	A-2		100	100	25-35	2.0-6.0	Low
5 Billings-Jocity										
Billings	0-60	Silty clay loam	CL or ML-CL	A-6 or A-7		100	100	75-90	.06-0.6	Moderate
Jocity (like)	0- 7	Loam	ML	A-4		100	100	50-65	0.6-2.0	Low
	7-12	Very fine sandy loam	SM	A-2 or A-4		100	100	30-40	0.6-2.0	Low
	12-60	Loam	ML or CL	A-4		100	100	80-95	0.6-2.0	Low
Christianburg (like)	0-60	Clay	CH	A-7		100	100	75-95	< 0.2	High
6 Penistaja-Valent										
Penistaja	0- 3	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
	3-30	Sandy clay loam	CL	A-6		100	100	50-75	0.6-2.0	Moderate
	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.6-2.0	Low
Valent	0-60	Loamy fine sand	SM	A-2		100	100	20-35	> 6.0	Low
Rock Land		(Engineering estimates not made)								
7 Penistaja-Lohmiller-Travessilla										
Penistaja	0- 3	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
	3-30	Sandy clay loam	CL	A-6		100	100	50-65	0.6-2.0	Moderate to high
	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.6-2.0	Low
Lohmiller (like)	0- 8	Clay loam	CL	A-6		100	100	70-90	0.2-0.6	Moderate to high
	8-60	Clay	CL or CH	A-6 or A-7		100	100	80-95	< 0.2	High
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								

8 Penistaja-Valent-Palma										
Penistaja	0- 5	Fine sandy loam	ML or SM	A-4		100	100	45-60	2.0-6.0	Low
	5-30	Sandy clay loam	CL	A-6		100	100	50-65	0.6-2.0	Low to moderate
	30-60	Fine sandy loam	ML	A-4		100	100	50-65	0.6-2.0	Low
Valent	0-10	Loamy sand	SM	A-2		100	100	15-30	>6.0	Low
	10-60	Fine sand and loamy sand	SM or SP-SM	A-2 or A-3		100	100	5-30	>6.0	Low
Palma	0- 9	Loamy fine sand	SM	A-2		100	100	20-35	2.0-6.0	Low
	9-20	Fine sandy loam	SM	A-4		100	100	35-50	2.0-6.0	Low
	20-60	Sandy loam or loamy fine sand	SM	A-2 or A-4		100	100	20-50	2.0-6.0	Low
9 La Fonda-Del Rio										
La Fonda	0- 4	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low
	4-16	Heavy loam	ML or CL	A-4 or A-6		100	100	60-75	0.6-2.0	Low to moderate
	16-60	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low
Del Rio	0-7	Loam	ML	A-4		100	100	75-90	0.6-2.0	Low
	7-37	Clay loam	CL	A-6		100	100	75-90	0.2-0.6	Moderate
	37-60	Clay loam	CL	A-6		100	100	75-85	0.6-2.0	Moderate
10 Lohmiller-San Mateo										
Lohmiller (like)	0-10	Clay loam	CL	A-6		100	100	70-90	0.2-0.6	Moderate to high
	10-60	Clay	CL or CH	A-6 or A-7		100	100	80-95	< 0.2	High
San Mateo	0-12	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low
	12-60	Stratified loam; sl;scl;cl	ML or CL	A-4 or A-6		100	100	55-85	0.6-2.0	Low to moderate
11 Moriarty-Prewitt										
Moriarty	0-60	Clay	CH	A-7		100	100	90-100	< 0.2	High
Prewitt	0-10	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low to moderate
	10-60	Clay loam (stratified)	CL	A-6 or A-7		100	100	70-95	0.2-0.6	Moderate
12 Sanson-Barnum										
Sanson	0-60	Silty clay loam (stratified)	CL	A-6 or A-7		100	100	65-95	0.2-2.0	Moderate
Barnum	0-24	Loam or light clay loam	ML or CL	A-4 or A-6		100	100	60-80	0.6-2.0	Moderate
	24-60	Stratified;scl;l;cl; and fsl	CL	A-6		100	100	50-85	0.6-2.0	Moderate
13 Hagerman-Travessilla										
Hagerman	0- 5	Fine sandy loam	ML	A-4		100	100	50-75	0.6-2.0	Low
	5-30	Sandy clay loam	CL	A-6		100	100	60-70	0.6-2.0	Low to moderate
	30+	Sandstone bedrock								
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	5-20	90-95	80-90	25-50	2.0-6.0	Low
	14+	Sandstone bedrock								
Rock Land		(Engineering estimates not made)								
14 Persayo-Lohmiller										
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	12+	Shale								
Lohmiller (like)	0-10	Clay loam	CL	A-6		100	100	70-90	0.2-0.6	Moderate to high
	10-60	Clay	CL or CH	A-6 or A-7		100	100	80-95	< 0.2	High
Badland		(Engineering estimates not made)								
15 Las Lucas-Litle-Persayo										
Las Lucas	0- 5	Loam	ML	A-6 or A-4		100	100	60-80	0.6-2.0	Moderate
	5-26	Silty clay loam	CL	A-6 or A-7		100	100	85-95	0.2-0.6	High
	26-50	Light silty clay loam	CL	A-6		100	100	80-95	0.2-0.6	Moderate to high
Litle	0-6	Silty clay loam	CL	A-6		100	100	85-95	0.2-0.6	Moderate to high
	6-28	Clay	CL	A-7		100	100	75-95	< 0.2	High
	28+	Shale								
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	12+	Shale								

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve—			Range in Permeability	Shrink-swell Potential
		USDA texture	United	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.74mm)		
16 Travessilla-Persayo										
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								
Persayo	0-12	Silty clay loam	CL	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	12+	Shale								
Rock Land		(Engineering estimates not made)								
17 Travessilla-Malposa										
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								
Malposa	0- 5	Stony loam	ML	A-4	10-25	85-95	85-95	50-70	0.6-2.0	Low
	5-16	Stony clay loam	CL	A-6	5-15	95-100	90-95	70-90	0.2-0.6	Moderate
	16-30	Stony loam (high lime)	ML or CL	A-4 or A-6	5-15	90-95	85-95	50-80	0.6-2.0	Low
	30+	Sandstone and shale								
Rock Land		(Engineering estimates not made)								
18 Rock Land-Travessilla										
Rock Land		(No estimates made)								
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								
19 Rock Land-Bond										
Rock Land		(Engineering estimates not made)								
	0- 4	Fine sandy loam	ML or SM	A-4		100	100	40-55	2.0-6.0	Low
	4-18	Sandy clay loam or sandy clay	CL or SC	A-6		100	100	35-60	0.2-0.6	Moderate
	18+	Sandstone								
Travessilla	0-14	Sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								
20 Ponil-Travessilla										
Ponil (like)	0- 5	Fine sandy loam	ML or SM	A-4		95-100	95-100	40-60	2.0-6.0	Low
	5-23	Clay	CL or CH	A-6 or A-7		100	100	70-95	< 0.2	High
	23-60	Clay	CL	A-6		100	100	70-85	0.2-0.6	Moderate
Travessilla	0-14	Fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone bedrock								
Silver	0- 8	Loam	ML	A-4		100	100	70-90	0.6-2.0	Low
	8-30	Clay or silty clay loam	CH or MH	A-7		100	100	75-90	0.2-0.6	High
	30-60	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Low
21 Prieta-Thunderbird										
Prieta	0- 3	Stony loam	GM	A-4 or A-2	10-15	45-55	40-50	20-40	0.6-2.0	Low
	3-12	Stony clay	CH or CL	A-7 or A-6	15-20	90-100	90-100	75-90	< 0.2	High
	12+	Basalt bedrock								
Rock Land		(Engineering estimates not made)								
Thunderbird	0- 8	Stony clay loam	CL	A-6	10-15	85-95	80-90	60-75	0.6-2.0	Moderate
	8-30	Cobbly clay	CL or CH	A-6 or A-7	15-20	75-90	70-85	65-80	< 0.2	High
	30+	Basalt bedrock								
22 Vamer-Ustorthent										
Vamer	0- 4	Loam and cobbly loam	ML	A-4	5-25	100	90-100	50-75	0.6-2.0	Low
	4-15	Clay	CH	A-7	5-15	100	100	75-95	< 0.2	High

Lithic Ustorthents	0-14	Sandy loam and fine sandy loam	SM	A-4 or A-2	0-25	70-95	60-90	25-40	2.0-6.0	Low
	14+	Sandstone								
Rock Land		(Engineering estimates not made)								
Typic Eutroboralfs	0-12	Loam	ML	A-4	0-15	100	100	60-75	0.6-2.0	Low
	12-48	Loam and light clay loam	ML or CL	A-6 or A-4	0-15	100	100	55-80	0.6-2.0	Low to moderate
23 Rock Land-Thunderbird										
Rock Land		(Engineering estimates not made)								
Thunderbird	0- 8	Stony clay loam	CL	A-6	10-15	85-95	80-90	60-75	0.6-2.0	Moderate
	8-30	Cobbly clay	CL or CH	A-6 or A-7	15-20	75-90	70-85	65-80	< 0.2	High
	30+	Basalt bedrock								
Torreon	0- 9	Loam	CL	A-6		100	100	65-75	0.6-2.0	Moderate
	9-30	Clay	CH	A-7		100	100	80-90	< 0.2	High
	30-60	Clay loam	CL	A-6		100	100	65-80	0.6-2.0	Moderate
Rudd	0-15	Gravelly loam and loam	GM or ML	A-4	15-25	70-90	65-85	45-65	0.6-2.0	Low
	15+	Basalt and indurated caliche								
Cabezon	0- 3	Stony loam	GM	A-4 or A-2	10-15	45-55	40-50	20-40	0.6-2.0	Low
	3-12	Clay	CH or CL	A-7 or A-6	15-20	90-100	90-100	75-90	< 0.2	High
	12+	Basalt bedrock								
24 Jekley-Eutroboralf										
Jekley	0- 3	Silt loam or stony silt loam	ML	A-4	0-15	100	100	70-90	0.6-2.0	Low
	3-12	Silty clay loam	CL	A-6 or A-7	0-15	100	100	85-95	0.2-0.6	Moderate
	12-24	Clay loam	CL	A-6 or A-7	10-30	100	100	70-95	0.2-0.6	Moderate
Osoridge	0- 5	Stony fine sandy loam	SM or SC	A-4	0-25	75-100	70-100	35-50	2.0-6.0	Low
	5- 9	Stony clay loam	CL or ML	A-6	0-25	95-100	95-100	50-80	0.6-2.0	Moderate
	9-22	Clay	CH	A-7	0-15	95-100	95-100	60-95	< 0.2	High
	22+	Interbedded sandstone and shale								
Rock Land		(Engineering estimates not made)								
Fort Wingate	0- 8	Loam or fine sandy loam	SM or ML	A-4		100	100	45-75	0.6-2.0	Low
	8-20	Sandy clay loam	SC	A-6		100	100	50-80	0.6-2.0	Moderate to high
	20-35	Sandy clay or clay	SC or CL	A-6 or A-7		100	100	45-80	0.2-0.6	High
	35+	Sandstone bedrock								
25 Zuni-Mirabal										
Zuni	0-12	Sandy loam	SM or ML	A-4	0- 5	90-95	85-95	35-70	2.0-6.0	Low
	12-40	Clay	CL or CH	A-6 or A-7		95-100	90-100	65-95	< 0.2	High
	40-48	Gravelly clay loam	CL or ML	A-6	0- 5	70-80	65-75	50-60	0.2-0.6	Moderate
	48+	Granite bedrock								
Mirabal	0-22	Stony loam or sandy loam	SM	A-2 or A-1	35-65	70-95	65-90	20-35	2.0-6.0	Low
	22+	Granite and Gneiss								
26 Thurloni-Savoia-Concho										
Thurloni	0- 6	Light clay or clay loam	CL	A-6 or A-7		100	100	70-95	< 0.2	High
	6-33	Clay	CH	A-7		100	100	75-95	< 0.2	High
	33+	Shale								
Savoia	0- 6	Fine sandy loam	SM or ML	A-4		100	100	40-55	2.0-6.0	Low
	6-24	Sandy clay loam	SC or CL	A-6		100	100	35-55	0.6-2.0	Moderate
	24-42	Fine sandy loam and sandy loam	SM or ML	A-4		100	100	35-55	2.0-6.0	Low
Concho	0-14	Clay loam	ML or CL	A-4 or A-6		100	100	35-55	2.0-6.0	Low
	14-42	Clay	CL or CH	A-6 or A-7		100	100	70-85	0.2-0.6	Moderat
	42-60	Clay loam or sandy clay loam	CL	A-6		100	100	75-95	< 0.2	High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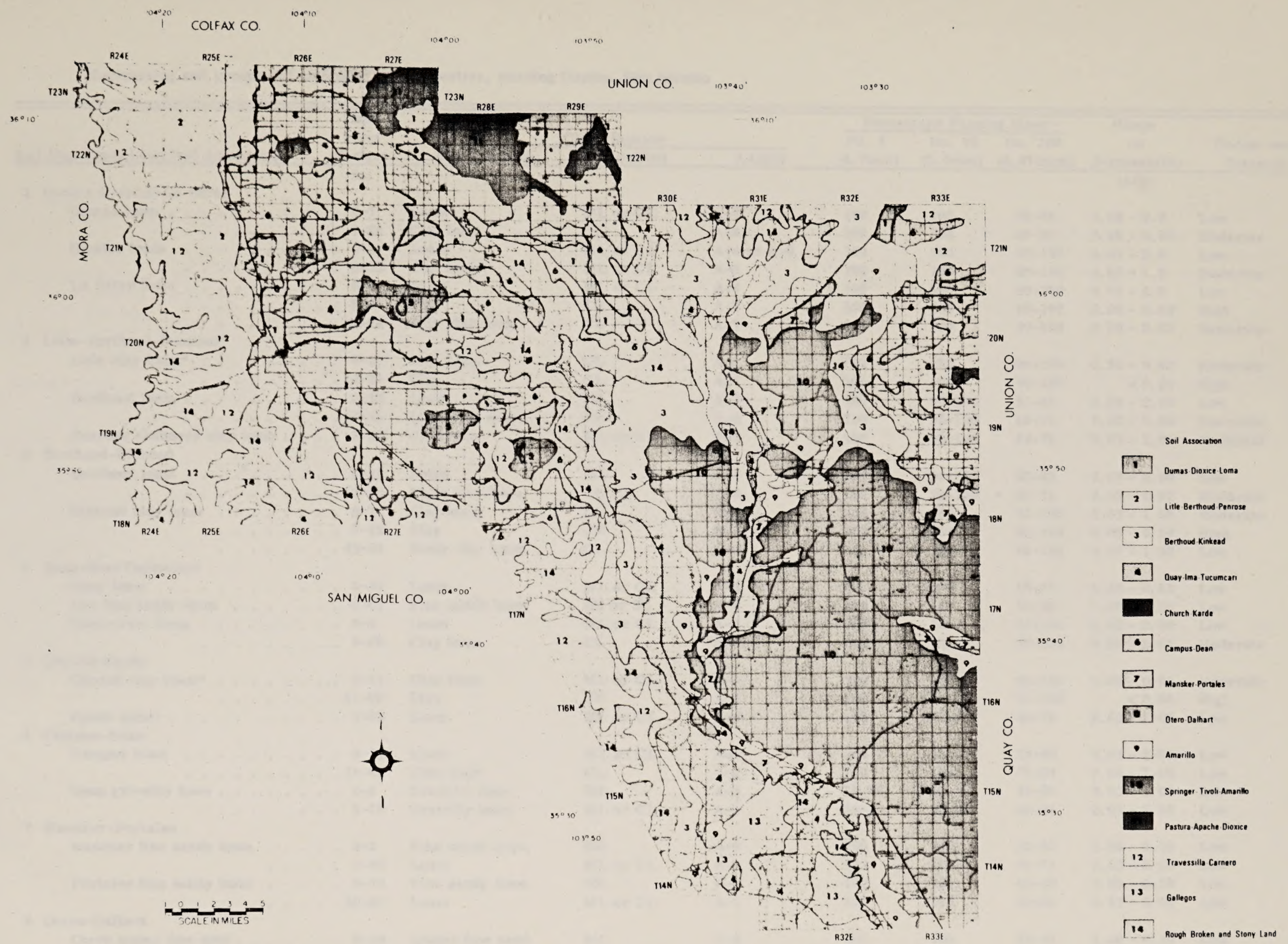
Soil Association
1 Travesilla-Carnero-Rock Land
2 Torreon-Apache
3 Spurlock-Texline
4 Colmor-Litle
5 Gruver-LaBrier
6 Dallam-Rickmore
7 Manzano-Alicia
8 Ustolls-Rock Land
0 1 2 3 4 5
SCALE IN MILES
N

Figure 1. General Soil Map of Union County, New Mexico

Engineering soil groups and estimated properties, Union County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)	Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO						
1 Travessilla-Carnero-Rock Land										
Travessilla	0- 8	Sandy loam or light loam	SM or ML	A-4 or A-2	0-25	75-100	65-90	20-70	2.0-6.0	Low
	8+	Sandstone bedrock								
Carnero	0- 9	Loam	ML or CL	A-4 or A-6	0- 5	95-100	95-100	50-75	0.6-2.0	Low
	9-30	Clay loam or clay	CL	A-6 or A-7	0- 5	85-100	80-100	60-90	0.2	High to moderate
	30+	Sandstone bedrock								
Rock Land		(No estimates made)								
2 Torreon-Apache										
Torreon	0-10	Silty clay loam or silt loam	ML or CL	A-4 or A-6		90-100	80-95	70-90	0.6-2.0	Low
	10-30	Clay	CH	A-7		95-100	90-100	75-95	0.2	High
	30-50	Silty clay loam	CL or CH	A-6 or A-7		100	100	85-95	0.2-0.6	Moderate to high
	50-60	Loam (high lime)	ML or CL	A-4	0-20	90-100	80-95	70-90	0.2-0.6	Low to moderate
Apache	0- 3	Cobbly loam	ML or CL	A-4	5-35	80-90	75-85	60-70	0.6-2.0	Low
	3-12	Cobbly clay loam	CL	A-6 or A-4	20-35	85-95	80-90	55-70	0.6-2.0	Low to moderate
	12+	Basalt								
Ayon	0-11	Cobbly loam	ML or CL	A-4 or A-6	5-40	70-100	70-100	65-95	0.6-2.0	Low to moderate
	11-40	Very cobbly loam	GC	A-2 or A-4	30-60	35-60	30-55	15-40	0.6-2.0	Low
Capulin	0-10	Heavy loam	CL	A-6 or A-7	0-25	80-100	80-100	50-90	0.6-2.0	Moderate
	10-31	Clay loam	CL	A-7	0-25	80-100	80-100	50-90	0.6-2.0	Moderate to high
	31-66	Cobbly loam (high lime)	CL	A-6 or A-4	15-60	80-100	75-100	50-80	0.6-2.0	Low to moderate
3 Spurlock-Texline										
Spurlock	0-16	Loam	ML or CL	A-4 or A-6		95-100	90-100	50-70	0.6-2.0	Low
	16-60	Clay loam	CL	A-6 or A-4		95-100	85-100	50-75	0.6-2.0	Low
Texline	0-10	Loam	ML or CL	A-4		100	100	50-75	0.6-2.0	Low
	10-40	Clay loam	CL	A-6		100	100	65-80	0.6-2.0	Moderate
	40-85	Sandy clay loam	CL	A-6		100	100	60-75	0.6-2.0	Low
Plack	0- 8	Loam, clay loam	ML or CL	A-4 or A-6		95-100	95-100	50-70	0.6-2.0	Low
	8+	Indurated caliche								
Guy	0-40	Gravelly sandy loam	SC or GC	A-2	0-25	60-100	45-90	15-30	2.0-6.0	Low
	40-60	Gravelly loamy sand	SM or GM	A-1 or A-2	0-25	50-100	40-90	10-30	6.0	Low
4 Colmor-Litle										
Colmor	0-32	Silty clay loam	CL	A-6 or A-7		100	100	75-95	0.2-0.6	Moderate to high
	32-54	Loam or light clay loam	ML or CL	A-4		100	100	60-75	0.6-2.0	Moderate
Litle	0- 8	Clay loam or silty clay loam	CL	A-6		100	100	70-95	0.2-0.6	Moderate
	8-24	Clay	CL	A-7 or A-6		100	100	75-95	0.2	High
	24+	Shale	CL	A-6 or A-7		100	100	85-95	0.2	Moderate to high
Kim	0- 8	Sandy loam	SM	A-4		100	100	35-50	2.0-6.0	Low
	8-60	Loam or light clay loam	ML or CL	A-6		100	100	60-75	0.6-2.0	Low to moderate

Soil Maps Symbol and Soil Association	Depth from Surface	Classification			Coarse Fraction Greater than 3 Inches	Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO		No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
5 Gruver-LaBrier										
Gruver	0- 8	Loam	CL	A-6 or A-4		100	100	60-75	0.6-2.0	Low
	8-40	Clay loam	CL or CH	A-6 or A-7		100	100	70-90	0.2-0.6	Moderate
	40-60	Light clay loam	CL	A-6		95-100	90-100	50-80	0.6-2.0	Low
LaBrier	0-13	Silty clay loam	CL	A-6 or A-7		100	100	75-95	0.2-0.6	Moderate
	13-49	Clay	CH or CL	A-7		100	100	75-95	0.2	High
	49-60	Silty clay loam	CL or CH	A-7 or A-6		100	100	75-95	0.2	Moderate
Sherm	0- 7	Clay loam	CL	A-6		100	100	70-80	0.2-0.6	Moderate
	7-35	Clay	CL or CH	A-7		100	100	75-95	0.2	High
	35-60	Clay loam	CL	A-6 or A-7		95-100	95-100	75-90	0.2-0.6	Moderate
Dioxice	0- 8	Loam	ML	A-4		100	100	50-75	0.6-2.0	Low
	8-35	Clay loam	CL	A-6		100	100	70-85	0.6-2.0	Moderate
	35+	High lime layer								
6 Dallam-Rickmore										
Dallam	0-10	Loamy sand	SM	A-2		100	100	15-35	2.0-6.0	Low
	0-10	Fine sandy loam	SM	A-4		100	100	35-50	2.0-6.0	Low
	10-60	Sandy clay loam	SC or CL	A-6		100	100	45-70	0.6-2.0	Low to moderate
Rickmore	0-10	Sandy loam	SM or ML	A-4		100	100	40-55	2.0-6.0	Low
	0-10	Loamy sand	SM	A-2 or A-4		100	100	20-40	2.0-6.0	Low
	10-35	Clay loam	CL	A-6 or A-7		100	100	60-80	0.2-0.6	Moderate
	35-90	Clay loam	CL	A-6		95-100	95-100	50-75	0.2-0.6	Moderate
Vingo	0-11	Loamy sand	SM	A-2		100	100	15-35	6.0	Low
	11-60	Sandy loam	SM	A-2 or A-4		100	100	25-45	2.0-6.0	Low
7 Manzano-Alicia										
Manzano	0-12	Loam	ML	A-4		100	100	60-80	0.6-2.0	Low
	12-50	Light clay loam	CL	A-6		100	100	70-85	0.2-0.6	Moderate
Alicia	0- 6	Loam	ML	A-4		100	100	60-90	0.6-2.0	Low
	6-30	Silty clay loam	CL	A-6		100	100	80-95	0.2-0.6	Moderate
	30-60	Silt loam	ML or CL	A-4 or A-6		100	100	60-90	0.2-0.6	Low to moderate
Kim	0-12	Loam	ML	A-4		100	100	60-75	0.6-2.0	Low
	12-60	Light clay loam or loam	CL	A-6		95-100	95-100	50-80	0.6-2.0	Moderate
8 Ustolls-Rock Land										
Ustolls	0- 6	Clay loam	CL	A-6 or A-7	0-20	85-100	80-100	60-95	0.2-0.6	Moderate to high
	6-26	Clay	CH	A-7	0-10	90-100	85-100	60-95	0.2	High
	26-60	Silty clay or clay loam	CH or CL	A-7 or A-6	0-10	90-100	85-100	60-95	0.2	High
Rock Land		Variable; no estimates made								
Aridic Haplustolls		Variable; no estimates made								
Raton	0- 9	Stony silt loam	ML or CL	A-6	40-70	95-100	90-95	65-85	0.6-2.0	Low
	9-15	Very stony clay	CH	A-7	50-90	90-100	85-90	65-85	0.2-0.6	Moderate to high
	15+	Basalt								


COLFAX CO.
UNION CO.
MORA CO.
SAN MIGUEL CO.
QUAY CO.
104°20
104°10
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103°30
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R24E
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T21N
T20N
T19N
T18N
T17N
T16N
T15N
T14N
N
0 1 2 3 4 5
SCALE IN MILES
Soil Association
1 Dumas-Dioxice-Loma
2 Litle Berthoud-Penrose
3 Berthoud-Kinkead
4 Quay-Ima-Tucumcari
Church-Karde
6 Campus-Dean
7 Mansker-Portales
8 Otero-Dalhart
9 Amarillo
10 Springer-Tivoli-Amarillo
Pastura-Apache-Dioxice
12 Travessilla-Carnero
13 Gallegos
14 Rough Broken and Stony Land

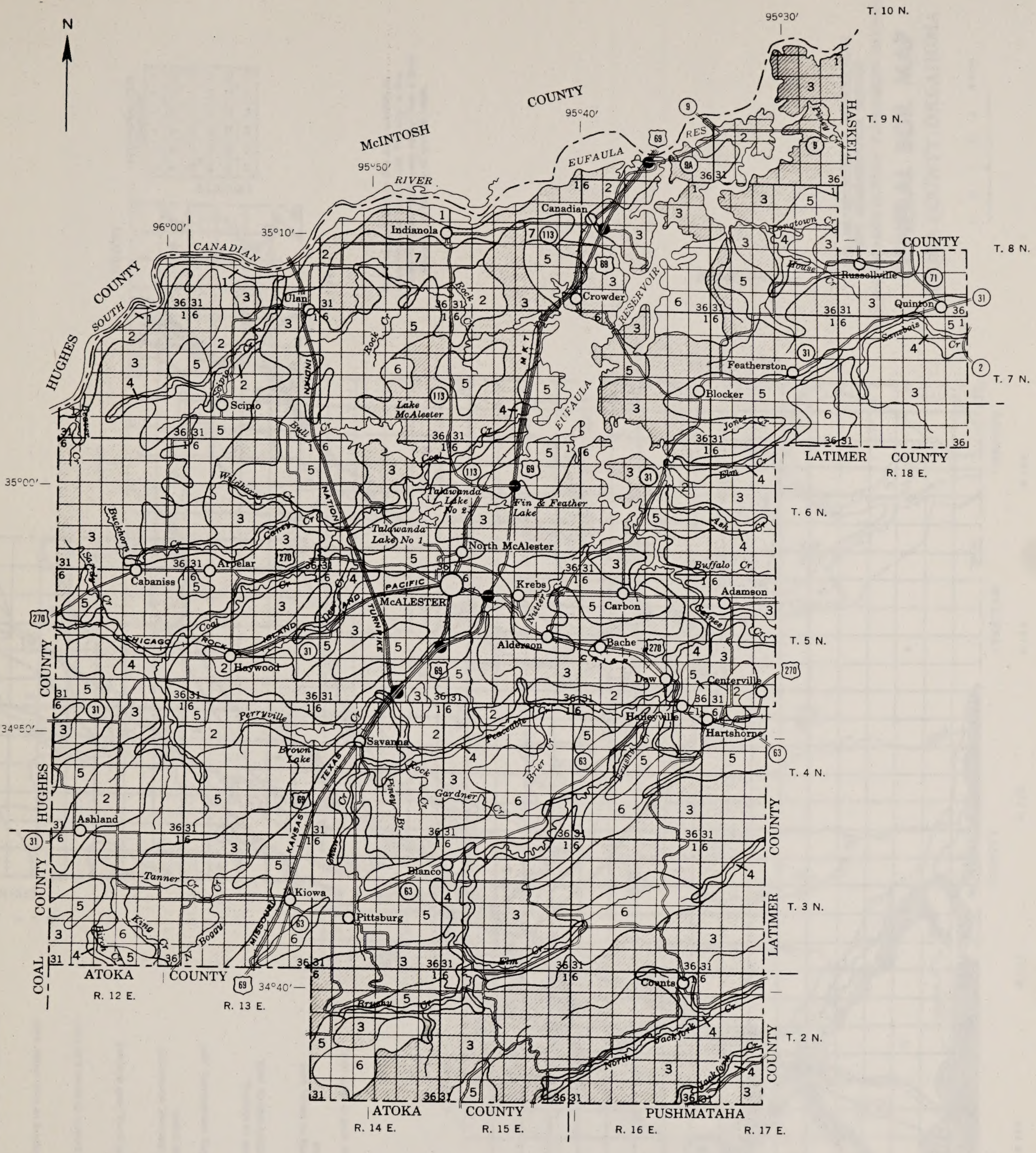
Figure 1. General soil map of Harding County, New Mexico

Engineering soil groups and estimated soil properties, Harding County, New Mexico

Soil Map Symbol and Soil Association	Depth from Surface	Classification			Percentage Passing Sieve--			Range in Permeability	Shrink-swell Potential
		USDA texture	Unified	AASHO	No. 4 (4.7mm)	No. 10 (2.0mm)	No. 200 (0.074mm)		
	in.							in/hr	
1 Dumas-Dioxice-La Brier									
Dumas loam	0-7	Loam	ML or CL	A-4	100	100	90-95	0.63 - 2.0	Low
	7-48	Clay loam	CL	A-6	100	100	90-95	0.20 - 0.63	Moderate
Dioxice loam	0-8	Loam	ML or CL	A-4 or A-6	100	100	90-100	0.63 - 2.0	Low
	8-35	Clay loam	ML or CL	A-6	100	100	90-100	0.63 - 1.5	Moderate
La Brier loam	0-8	Loam	ML or CL	A-4	100	100	90-100	0.63 - 2.0	Low
	8-31	Clay	CH	A-7	100	100	90-100	0.05 - 0.63	High
	31-72	Silty clay loam	CL	A-7	100	100	90-100	0.20 - 0.63	Moderate
2 Litle-Berthoud-Penrose									
Litle clay loam*	0-10	Clay loam	CL	A-6	100	100	90-100	0.20 - 0.63	Moderate
	10-24	Clay	CL	A-7	100	100	90-100	< 0.20	High
Berthoud loam	0-12	Loam	ML	A-4	100	95-100	50-65	0.63 - 2.00	Low
	12-50	Light clay loam	CL	A-6	100	95-100	60-75	0.63 - 2.00	Moderate
Penrose channery clay loam	0-10	Clay loam	ML or CL	A-6	100	90-100	60-70	0.63 - 2.00	Moderate
3 Berthoud-Kinkead									
Berthoud loam	0-12	Loam	ML	A-4	100	95-100	50-65	0.63 - 2.00	Low
	12-50	Light clay loam	CL	A-6	100	35-100	60-75	0.63 - 2.00	Moderate
Kinkead clay loam	0-7	Clay loam	CL	A-6	100	100	95-100	0.63 - 1.50	Moderate
	7-42	Clay	CH	A-7	100	100	95-100	0.05 - 0.20	High
	42-55	Sandy clay loam	CL	A-6	100	100	95-100	0.63 - 1.50	Low
4 Quay-Ima-Tucumcari									
Quay loam	0-42	Loam	ML or CL	A-4	100	100	60-75	0.20 - 0.63	Low
Ima fine sandy loam	0-47	Fine sandy loam	SM or SC	A-4	100	100	35-50	2.00 - 6.30	Low
Tucumcari loam	0-8	Loam	ML or CL	A-4	100	100	95-100	0.63 - 2.00	Low
	8-60	Clay loam	CL	A-6	100	100	95-100	0.05 - 0.63	Moderate
5 Church-Karde									
Church clay loam*	0-11	Clay loam	ML or CL	A-6	100	100	95-100	0.05 - 0.63	Moderate
	11-60	Clay	CH	A-7	100	100	95-100	< 0.06	High
Karde loam*	0-60	Loam	ML or CL	A-6	100	100	50-70	0.63 - 2.00	Low
6 Campus-Dean									
Campus loam	0-18	Loam	ML or CL	A-4	100	100	70-80	0.63 - 2.00	Low
	18-60	Clay loam	CL	A-6	100	100	70-80	0.63 - 2.00	Low
Dean gravelly loam	0-6	Gravelly loam	SM	A-4	70-80	60-70	40-50	0.63 - 2.00	Low
	6-18	Gravelly loam	ML or CL	A-4	40-50	35-45	25-35	0.63 - 2.00	Low
7 Mansker-Portales									
Mansker fine sandy loam	0-5	Fine sandy loam	SM	A-2	100	100	35-50	2.00 - 6.30	Low
	5-60	Loam	ML or CL	A-4	100	100	60-75	0.63 - 2.00	Low
Portales fine sandy loam	0-10	Fine sandy loam	SM	A-2	100	100	40-50	2.00 - 6.30	Low
	10-60	Loam	ML or CL	A-4	100	100	50-60	0.63 - 2.00	Low
8 Otero-Dalhart									
Otero loamy fine sand	0-10	Loamy fine sand	SM	A-2	100	100	20-35	2.00 - 6.30	Low
	10-28	Fine sandy loam	SM	A-2	100	100	30-50	2.00 - 6.30	Low
	28-60	Loamy sand	SM	A-2	100	100	15-30	2.00 - 6.30	Low
Dalhart fine sandy loam	0-6	Fine sandy loam	SM	A-2	100	100	25-40	2.00 - 6.30	Low
	6-50	Sandy clay loam	SC or CL	A-4 or A-6	100	100	45-90	0.63 - 2.00	Low to moderate

9 Amarillo									
Amarillo fine sandy loam	0-8	Fine sandy loam	SM	A-2	100	100	20-35	2.00 - 6.30	Low
. . . . .	8-48	Sandy clay loam	SC or CL	A-6	100	100	40-55	0.63 - 2.00	Low to moderate
. . . . .	48-60	Sandy clay loam	CL	A-6	100	100	50-70	0.63 - 2.00	Low to moderate
10 Springer-Tivoli-Amarillo									
Springer loamy fine sand	0-65	Loamy fine sand	SM	A-2	100	100	15-25	2.00 - 6.30	Low
Tivoli fine sand	0-65	Fine sand	SP or SM-SP	A-3	100	100	0-15	> 6.30	Low
Amarillo loamy fine sand	0-10	Loamy fine sand	SM	A-2	100	100	15-25	2.00 - 6.30	Low
. . . . .	10-48	Sandy clay loam	SC or CL	A-6	100	100	40-55	0.63 - 2.00	Low to moderate
. . . . .	48-60	Sandy clay loam	CL	A-6	100	100	50-70	0.63 - 2.00	Low to moderate
11 Pastura-Apache									
Pastura loam	0-7	Loam	ML or CL	A-4 or A-6	65-80	60-75	50-65	0.63 - 2.00	Low
Apache stony loam	0-12	Stony loam	GM	A-4	50-60	50-60	40-50	0.63 - 2.00	Low to moderate
Dioxice loam.	0-8	Loam	ML or CL	A-4 or A-6	100	100	90-100	0.63 2.00	Low
. . . .	8-35	Clay loam	ML or CL	A-6	100	100	90-100	0.63 - 1.50	Moderate
12 Travessilla-Carnero									
Travessilla stony loam	0-8	Stony loam	GM or GC	A-2	85-95	75-85	35-50	0.63 - 2.00	Low
Carnero loam	0-6	Loam	ML or CL	A-4	100	100	90-100	0.63 - 2.00	Low
. . . .	6-36	Clay loam	CL	A-6	100	100	90-100	0.63 - 2.00	Moderate
13 Gallegos									
Gallegos gravelly sandy loam . . .	3-21	Very gravelly sandy clay loam	GC	A-1	40-45	25-35	15-20	2.00 - 6.30	Low
14 Rough broken and stony land	(No estimates made)								

*Soil slightly to moderately saline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95°30′
T. 10 N.
T. 9 N.
T. 8 N.
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T. 6 N.
T. 5 N.
T. 4 N.
T. 3 N.
T. 2 N.
95°40′
95°50′
96°00′
35°10′
35°00′
34°50′
34°40′
McINTOSH COUNTY
HASKELL COUNTY
LATIMER COUNTY
HUGHES COUNTY
SOUTH CANADIAN
COAL COUNTY
ATOKA COUNTY
PUSHMATAHA
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
R. 16 E.
R. 17 E.
R. 18 E.
RIVER
CANADIAN
EUFAULA RES
EUFAULA RESERVOIR
Canadian
Indianola
Ulan
Crowder
Scipio
Lake McAlester
Russellville
Quinton
Featherston
Blocker
Talawanda Lake No 2
Talawanda Lake No 1
Fin & Feather Lake
North McAlester
McALESTER
Krebs
Carbon
Adamson
Cabaniss
Arpelar
Haywood
Alderson
Bache
Dow
Centerville
Haileyville
Hartshorne
Savanna
Brown Lake
Ashland
Blanco
Kiowa
Pittsburg
Counts
INDIAN NATION TURNPIKE
PACIFIC
ROCK ISLAND
CHICAGO
M K T
MISSOURI KANSAS TEXAS
C R I & P
Buckhorn Cr
Coal Cr
Bull Cr
Rock Cr
Gaines Cr
Elm Cr
Ash Cr
Buffalo Cr
Jones Cr
Brushy Cr
Peaceable Cr
Gardner Cr
Brier Cr
Pine Br
Tanner Cr
Birch Cr
Kings Cr
N Boggy
Jackfork Cr
North Jackfork
Sans Bois Cr
Longtown Cr
House Cr
Pecan Cr
Waldhorse Cr
Coal Cr
Perryville
Sandy Cr
Beaver Cr
Nutter
Owl Cr

SOIL ASSOCIATIONS

1	Yahola-Norwood association: Nearly level, well-drained, loamy soils on flood plains, in deep, recent alluvium
2	Dougherty-Stidham association: Nearly level to moderately steep, well-drained, sandy soils on forested uplands, in deep, old alluvium
3	Enders-Hector-Hartsells association: Very gently sloping to steep, well-drained to excessively drained, loamy soils on forested uplands; moderately deep to shallow over shale or sandstone
4	Ennis-Verdigris-Rosebloom association: Nearly level, moderately well drained to poorly drained soils on flood plains, in deep, old alluvium
5	Dennis-Parsons-Bates association: Nearly level to gently sloping, somewhat poorly drained to well drained, loamy soils on prairie uplands; deep to moderately deep over shale or sandstone
6	Talihina-Eram-Collinsville association: Gently sloping to moderately steep, well drained to moderately well drained, stony, loamy soils on prairie uplands; very shallow to moderately deep over shale or sandstone
7	Vanoss-Choteau association: Nearly level to very gently sloping, well drained to moderately well drained, loamy soils on prairie uplands, in deep, old alluvium

April 1970

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
PITTSBURG COUNTY, OKLAHOMA

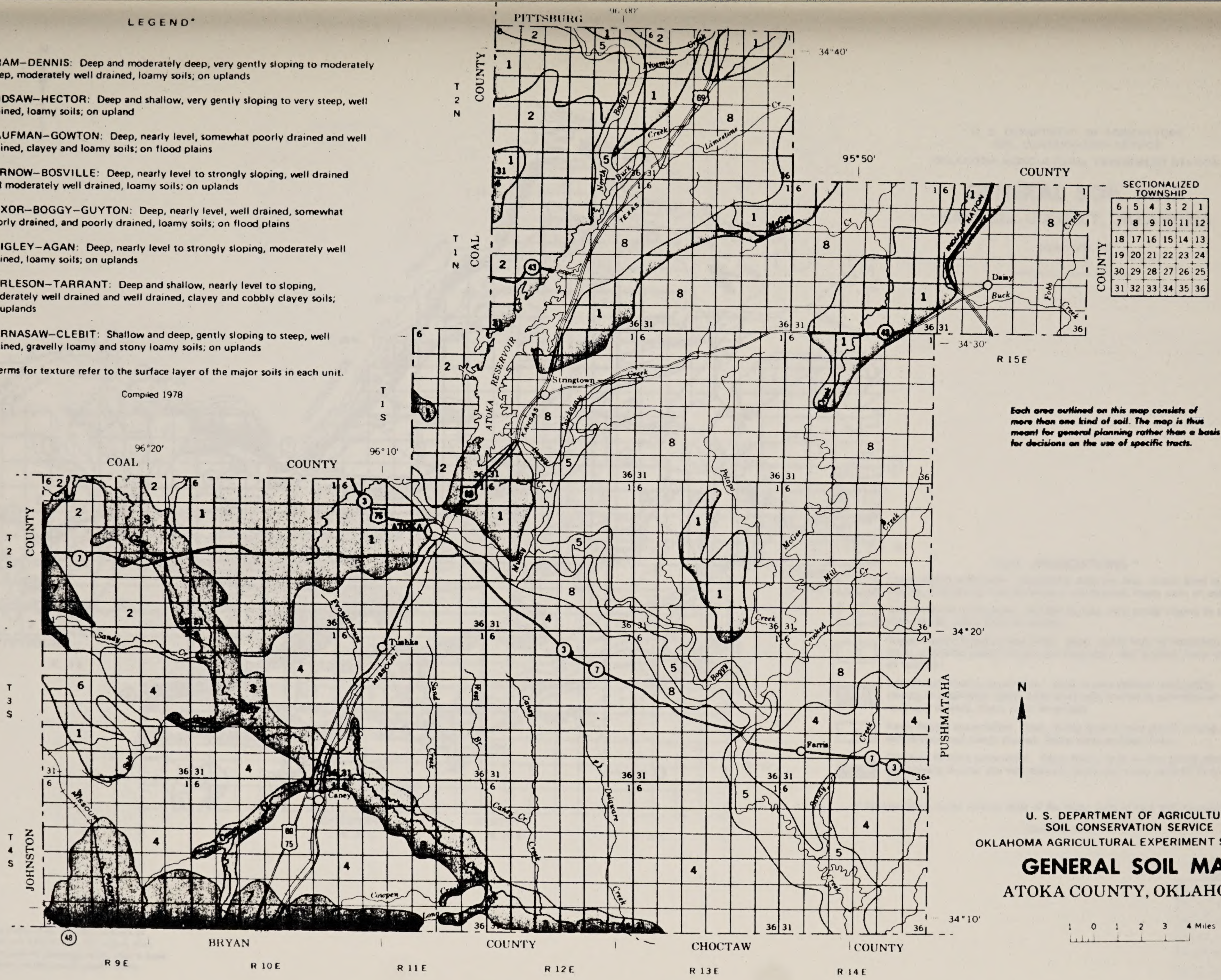
Scale 1:316,800
1 0 1 2 3 4 5 Miles

LEGEND*

▨ 1	**ERAM–DENNIS:** Deep and moderately deep, very gently sloping to moderately steep, moderately well drained, loamy soils; on uplands
2	**ENDSAW–HECTOR:** Deep and shallow, very gently sloping to very steep, well drained, loamy soils; on upland
■ 3	**KAUFMAN–GOWTON:** Deep, nearly level, somewhat poorly drained and well drained, clayey and loamy soils; on flood plains
4	**BERNOW–BOSVILLE:** Deep, nearly level to strongly sloping, well drained and moderately well drained, loamy soils; on uplands
5	**REXOR–BOGGY–GUYTON:** Deep, nearly level, well drained, somewhat poorly drained, and poorly drained, loamy soils; on flood plains
▨ 6	**CHIGLEY–AGAN:** Deep, nearly level to strongly sloping, moderately well drained, loamy soils; on uplands
■ 7	**BURLESON–TARRANT:** Deep and shallow, nearly level to sloping, moderately well drained and well drained, clayey and cobbly clayey soils; on uplands
8	**CARNASAW–CLEBIT:** Shallow and deep, gently sloping to steep, well drained, gravelly loamy and stony loamy soils; on uplands

*Terms for texture refer to the surface layer of the major soils in each unit.

Compiled 1978


PITTSBURG COUNTY
COAL COUNTY
COAL COUNTY
JOHNSTON COUNTY
BRYAN COUNTY
CHOCTAW COUNTY
PUSHMATAHA COUNTY
COUNTY
96°00'
34°40'
95°50'
34°30'
34°20'
34°10'
96°10'
96°20'
T 2 N
T 1 N
T 1 S
T 2 S
T 3 S
T 4 S
R 9 E
R 10 E
R 11 E
R 12 E
R 13 E
R 14 E
R 15 E
ATOKA RESERVOIR
ATOKA
Stringtown
Tushka
Caney
Farris
Daisy
Buck
INDIAN NATION
KANSAS
TEXAS
MISSOURI
PACIFIC
Boggy
North
Buck
Creek
Limestone
Cr
McGee
Fobb
Creek
Chickasaw
Potapo
McGee
Mill
Cr
Crooked
Creek
Muddy
Sandy
Cr
Frogsterhouse
Sand
Creek
West
Br
Caney
Cr
Delaware
Creek
Cowpen
Long
Caney
Creek
Sandy
Creek
Boggy
N
1 0 1 2 3 4 Miles

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

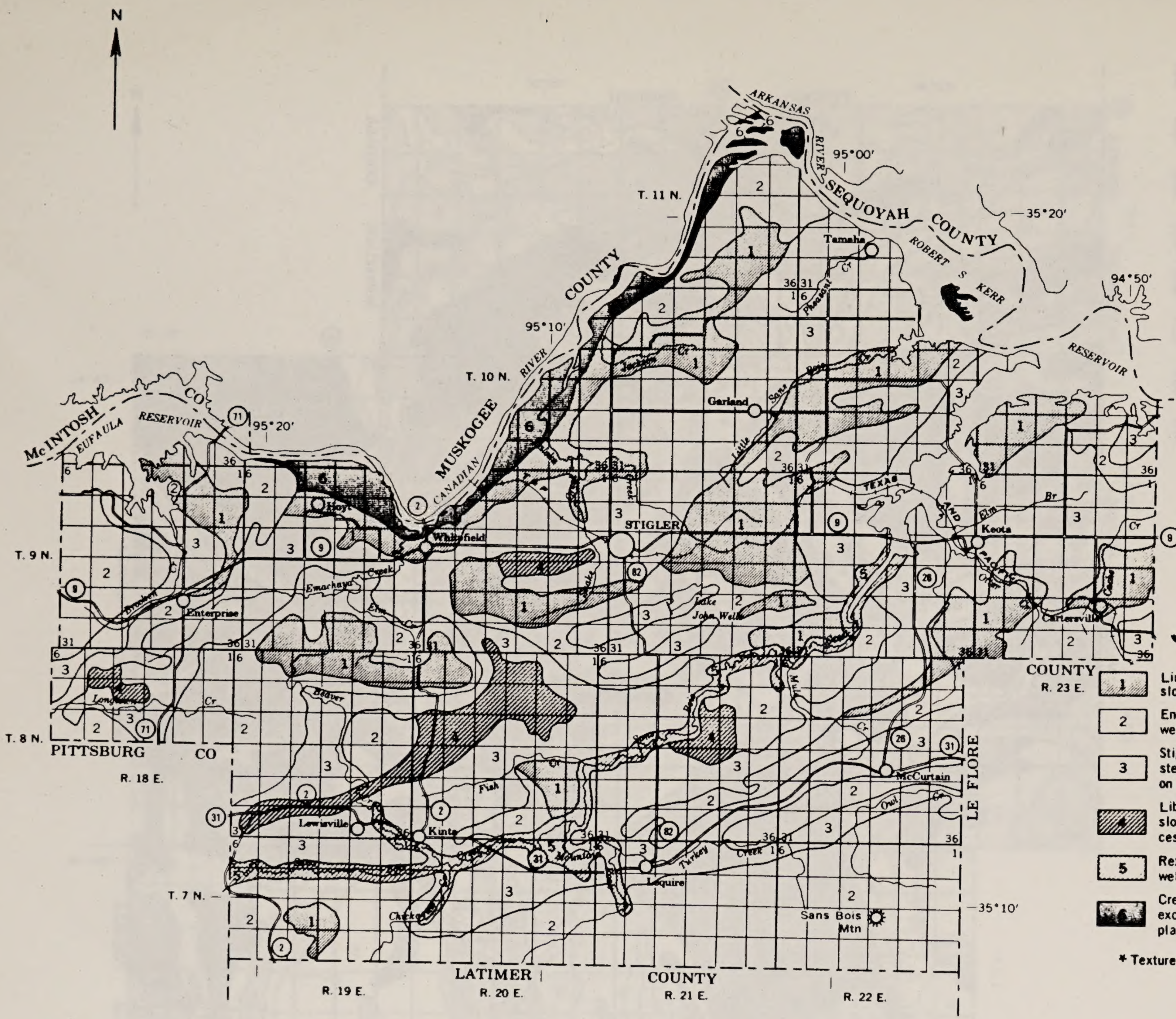
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
ATOKA COUNTY, OKLAHOMA

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
HASKELL COUNTY, OKLAHOMA

Scale 1:253,440
1 0 1 2 3 4 Miles


N
ARKANSAS
RIVER
95°00'
SEQUOYAH COUNTY
ROBERT S KERR
RESERVOIR
35°20'
94°50'
T. 11 N.
T. 10 N.
T. 9 N.
T. 8 N.
T. 7 N.
95°10'
95°20'
McINTOSH CO
EUFAULA RESERVOIR
MUSKOGEE COUNTY
CANADIAN RIVER
PITTSBURG CO
LATIMER COUNTY
LE FLORE COUNTY
R. 18 E.
R. 19 E.
R. 20 E.
R. 21 E.
R. 22 E.
R. 23 E.
35°10'
Tamaha
Garland
Hoyt
Whitefield
STIGLER
Enterprise
Keota
Cartersville
McCurtain
Lewisville
Kinta
Lequire
Sans Bois Mtn
Lake John Wells
TEXAS AND PACIFIC
Emachaya Creek
Fish
Turkey Creek
Mountain
Beaver
Longtown
Owl Cr
Jackson Cr
Pheasant Cr
Little Sans Bois
Elm Br
Brushy
Chickasaw
9
71
2
82
28
31

SOIL ASSOCIATIONS *

1 Linker-Naldo association: Moderately deep and deep, nearly level to sloping, well drained and moderately well drained, loamy soils on uplands

2 Enders-Hector association: Shallow to deep, very gently sloping to steep, well-drained, loamy soils on uplands

3 Stigler-Counts-Tamaha association: Deep, nearly level to moderately steep, somewhat poorly drained and moderately well drained, loamy soils on uplands

4 Liberal-Collinsville association: Deep to very shallow, very gently sloping to moderately steep, moderately well drained to somewhat excessively drained, loamy soils on uplands

5 Rexor-Guyton association: Deep, nearly level or very gently sloping, well drained and poorly drained, loamy soils on flood plains

6 Crevasse-Oklared association: Deep, nearly level or very gently sloping, excessively drained and well drained, loamy and sandy soils on flood plains

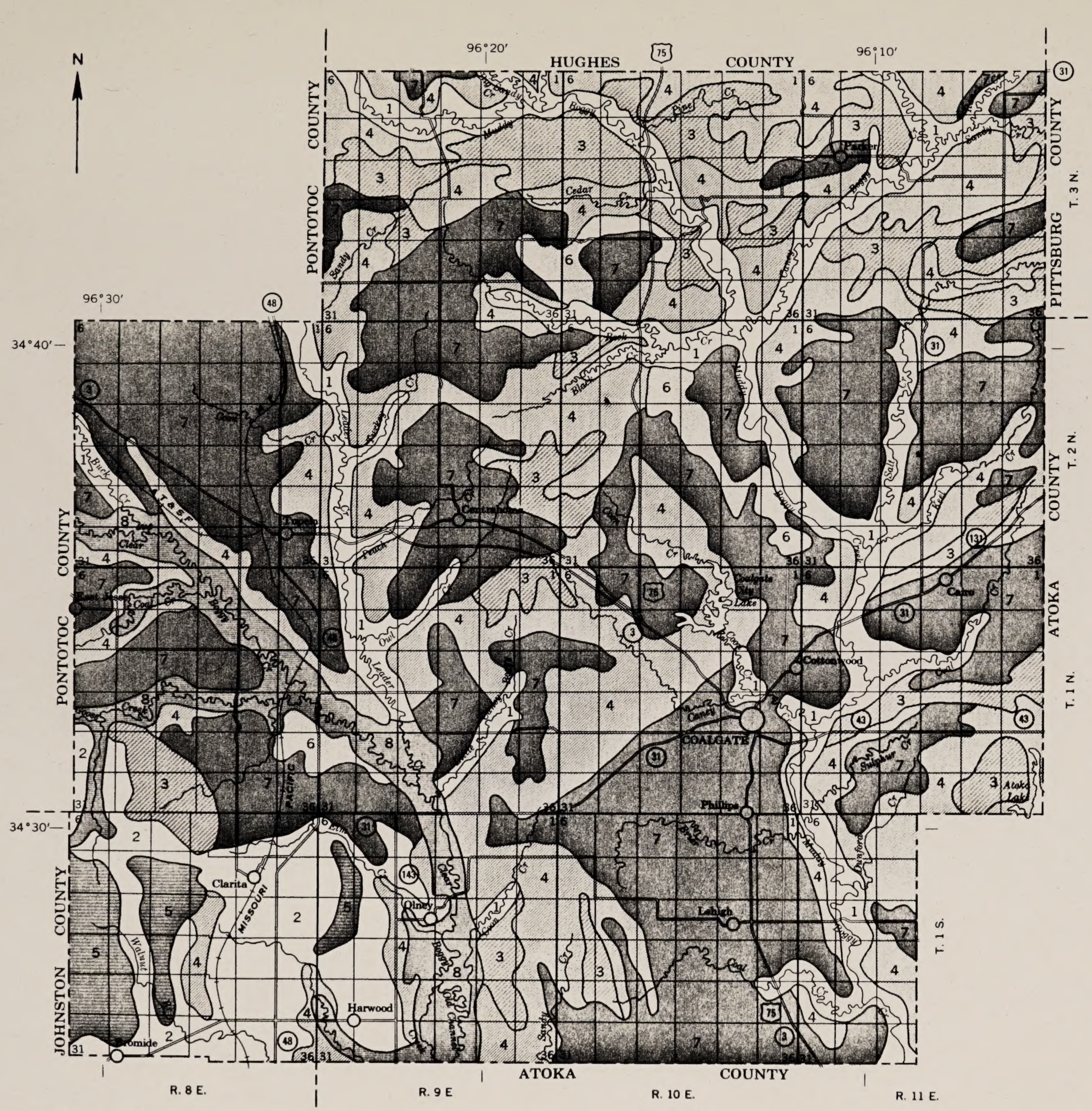
* Texture refers to the surface layer of the major soils in each soil association.

Compiled 1973

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.


N
96°20′
96°10′
96°30′
34°40′
34°30′
HUGHES COUNTY
PONTOTOC COUNTY
PITTSBURG COUNTY
ATOKA COUNTY
JOHNSTON COUNTY
T. 3 N.
T. 2 N.
T. 1 N.
T. 1 S.
R. 8 E.
R. 9 E
R. 10 E.
R. 11 E.
COALGATE
Centrahoma
Tupelo
Cottonwood
Phillips
Lehigh
Cairo
Clarita
Olney
Harwood
Bromide
Parker
Coalgate City Lake
Atoka Lake
MISSOURI PACIFIC
T & S F
Muddy Boggy Cr
Clear Boggy Cr
Leader Cr
Sandy Cr
Cedar Cr
Caney Boggy Cr
Sulphur Cr
Coal Cr
Old Channel
Walnut
Buck Cr
Owl Cr
Bird Cr
Salt Cr
Rock Cr
Peach Cr
Black Cr
Caney Cr
75
31
48
3
43
131
143

	SOIL ASSOCIATIONS *
1	Lanton-Ennis-Robinsonville association: Deep, nearly level to gently sloping, loamy soils underlain by loamy or clayey sediment; on flood plains
2	Crockett-Burleson-Wilson association: Deep, nearly level to gently sloping, loamy and clayey soils that have a clayey subsoil over clayey sediment or shale; on uplands
3	Homa-Rock outcrop association: Deep, moderately steep and steep, loamy soils that have a clayey subsoil over shale or clay, and rock outcrops; on uplands
4	Hartsells-Homa association: Moderately deep and deep, very gently sloping to sloping, loamy soils that have a loamy or clayey subsoil over shale, clay, or sandstone; on uplands
5	Talpa-Rock outcrop association: Very shallow and shallow, sloping to steep, loamy soils over limestone, and rock outcrops; on uplands
6	Steedman-Collinsville association: Moderately deep to very shallow, very gently sloping to steep, loamy soils that have a clayey or loamy subsoil over shale or sandstone; on uplands
7	Bonham-Bates-Parsons association: Deep and moderately deep, nearly level to gently sloping, loamy soils that have a clayey and loamy subsoil over sandstone, shale, or loamy or clayey sediment; on uplands
8	Lanton-Kaufman-Robinsonville association: Deep, nearly level to gently sloping, loamy and clayey soils underlain by loamy or clayey sediment; on flood plains

* Textures given are those for the surface layer of the major soils of the association.

Compiled 1972

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
OKLAHOMA AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

COAL COUNTY, OKLAHOMA

Scale 1:190,080
1 0 1 2 3 4

area outlined on this map consists of
than one kind of soil. The map is thus
for general planning rather than a basis

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